NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

AN INTERACTIVE COMPUTER FORECASTING MODEL
TO DETERMINE THE EFFECTS OF POLICY CHANGES ON
THE VALUATION OF THE MILITARY RETIREMENT SYSTEM

by

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December 1986

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REPORT DOCUMENTATION PAGE

1a REPORT SECURITY CLASSIFICATION UNCLASSIFIED	1b RESTRICTIVE MARKINGS
2a SECURITY CLASSIFICATION AUTHORITY	3 DISTRIBUTION / AVAILABILITY OF REPORT Approved for public release; Distribution is unlimited
2b DECLASSIFICATION / DOWNGRADING SCHEDULE	
4 PERFORMING ORGANIZATION REPORT NUMBER(S)	5 MONITORING ORGANIZATION REPORT NUMBER(S)
6a NAME OF PERFORMING ORGANIZATION Naval Postgraduate School 6b OFFICE SYMBOL (If applicable) 54	7a NAME OF MONITORING ORGANIZATION Naval Postgraduate School
6c ADDRESS (City, State, and ZIP Code) Monterey, California 93943-5000	7b ADDRESS (City, State, and ZIP Code) Monterey, California 93943-5000
8a NAME OF FUNDING / SPONSORING ORGANIZATION 8b OFFICE SYMBOL (If applicable)	9 PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c ADDRESS (City, State, and ZIP Code)	10 SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO / PROJECT NO / TASK NO / WORK UNIT ACCESSION NO

11 TITLE (Include Security Classification)
AN INTERACTIVE COMPUTER FORECASTING MODEL TO DETERMINE THE EFFECTS OF POLICY CHANGES ON THE VALUATION OF THE MILITARY RETIREMENT SYSTEM.

12 PERSONAL AUTHOR(S)
Valko, Peter G.

13a TYPE OF REPORT	13b TIME COVERED	14 DATE OF REPORT (Year, Month, Day)	15 PAGE COUNT
Master's Thesis	FROM _____ TO _____	1986 December	131

16 SUPPLEMENTARY NOTATION

17 COSATI CODES			18 SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	Military Retirement, computer forecasting, computer simulation.

19 ABSTRACT (Continue on reverse if necessary and identify by block number)

In the past thirty years, as military retirement costs have climbed from 1% of the defense budget to their current 8% level, the military retirement system (and, in particular, the non-disability retirement component) has come under increasing criticism and scrutiny by the Congress, the public, and the news media. Recommendations from previous studies of the military retirement system have proposed various modifications to the system to alleviate alleged inequities and inefficiencies, and to reduce costs. A BASIC-language computer model (ENTRYAGE) was developed in 1983 as part of a thesis to perform a sensitivity analysis on entry-age normal retirement cost methods to evaluate some of these recommendations. At the request of the Office of the Assistant Secretary of Defense, an effort was initiated to revise the program to produce results that replicate those of the Military

20 DISTRIBUTION / AVAILABILITY OF ABSTRACT ☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT ☐ DTIC USERS	21 ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED
22a NAME OF RESPONSIBLE INDIVIDUAL K. J. Euske	22b TELEPHONE (Include Area Code) 408-646-2860 22c OFFICE SYMBOL 54Ee

19 ABSTRACT (cont.)

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An Interactive Computer Forecasting Model to Determine the Effects of Policy Changes on the Valuation of the Military Retirement System

by

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Lieutenant Commander, United States Navy
B.S., Aero-Space Institute, 1971

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

NAVAL POSTGRADUATE SCHOOL
December 1986

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"The (non-disability retirement) plan proposed is basically a penalty provision for early, voluntary retirement."
William Francis, Asst. SECDEF (MP,R), 1958

"The non-disability retirement system is inefficient, inequitable, and costly."
The Interagency Committee, 1971

"Military retirement. . .is a key issue that has to be faced. The stakes are high; the financial consequences are potentially greater than those involved in the major debates over force levels and weapon systems."
Martin Binkin, *The Military Pay Muddle*, 1975

"The military retirement system is wasteful in dollars and human resources."
The President's Commission on Military Compensation, 1978

"There probably is no other retirement system which is as liberal and costly as the U.S. Military Retirement System."
Grace Commission, 1984

". . .(the military retirement system). . .is a scandal; it's an outrage."
David Stockman, Budget Director, OMB, 1985

A. INTRODUCTION

As the above comments indicate, the military retirement system has had its share of critics over the years. Most of the criticisms leveled at the military retirement system stem from a few basic arguments: (1) non-disability retirement allows military personnel to retire at too early of an age; (2) retirement benefits (annuities) are too liberal; (3) lack of vesting until 20 years of service makes superiors reluctant to involuntary separate marginal or poor performers who are close to retirement; and, by far, the strongest criticism, (4) the military retirement system just costs too much.

The present military retirement system allows a service member to receive a non-disability retirement after 20 years of active duty service with a retirement annuity of 50% of the service member's final basic pay (or the average of the highest three years for those joining the Service after September 8, 1980). This annuity increases with additional active duty service so that a retiree with 30 years or more of service will receive 75% of basic pay. Provisions are also made for disability and reserve retirement, as well as an optional survivor benefit plan.

The costs of this retirement system have become a major issue. In the ten years from 1973 to 1983, the number of retirees paid by the Department of Defense (DoD) increased 43% from 935,272 to 1,333,360 individuals. However, for this same period of time, DoD expenditures for the military retirement system grew 263% from $4.4 billion to $15.9 billion. Looking back over the last thirty years from 1953, costs have increased almost 4,400% from $356 million while the number of military personnel receiving retired pay has increased only about 800% from 155,892. Retirement costs, then, have grown at approximately 5 to 6 times faster than the retirement rolls. Military retirement costs currently account for approximately 8% of the defense budget.

As the costs have increased, the military retirement system (specifically, the non-disability retirement portion which accounts for over eighty percent of the cost) has come under closer and closer Congressional, public, and media scrutiny. To reduce costs, proposals have been made, inter alia, to lower annuities, extend the minimum length of service required for retirement, and delay the commencement of retired pay until 55, 60, or 62 years of age. The question arises, however, if the proposed modifications to the military retirement system will produce the desired results. Will costs, in fact, be reduced? What effect will reducing non-disability retirement benefits

have on new accessions and retention, on recruiting and training costs? To what extent is the retirement system used as a force mangement tool?

This thesis attempts to deal with these issues. In order to provide an understanding of how the current retirement system came to be established, this first chapter contains a review of the legislation that has affected military retirement. Additionally, the recommendations of previous commissions, review panels, and study groups that have dealt with military retirement issues are briefly examined. Subsequent chapters deal more extensively with the provisions of the current retirement system and the costs of its component parts. Finally, a computer model used to project future retirement costs is presented and discussed.

B. LEGISLATIVE HISTORY OF THE MILITARY RETIREMENT SYSTEM

The beginnings of the military retirement system in the United States date back some three hundred and fifty years. In 1636, the Pilgrims at Plymouth Rock provided that any soldier becoming disabled would be maintained by the colony for the rest of his life [Ref. 1: p. VII-1].

The first national pension law was enacted in 1776 and provided half pay for life (or, for the duration of the disability) for disabled soldiers. Immediately after the Revolutionary War and again in 1790, legislation was passed making provisions for disabled military personnel: officers could receive up to one-half of their pay, while enlisted personnel could receive up to $5 a month for life. Benefits were increased for disabled Revolutionary War veterans in 1818 and again in 1832. [Ref. 1: p. VII-1]

In 1855, legislation was passed which permitted the Secretary of the Navy to determine the fitness of officers and allowed the removal of those officers judged incapable. Those determined to be incapable were removed from active duty with either leave-of-absence pay (approximately 75% of sea-duty pay) or furlough pay (50%

of leave-of-absence pay). Though the main purpose of this legislation was to remove old and physically unfit Naval officers from active duty, the law could also be used to separate officers for non-disability reasons. [Refs. 1,2: p. VII-1,p. 145]

The first major non-disability legislation was enacted in 1861 at the beginning of the Civil War. This act provided for the voluntary retirement (at the discretion of the President) of regular officers of all branches of the military service after 40 years of active duty. The purpose of this legislation was to allow older officers, unfit for duty in the Civil War, to retire. Later legislation in 1861 and 1862 authorized involuntary retirement, i.e., an officer could be forced to retire upon reaching a certain age or years-in-service point. However, nothing in the legislation compelled authorities to take such actions. [Refs. 1,2: p. VII-2,p. 145]

After the Civil War, while reducing military forces to a peacetime level, Congress passed legislation in 1870 which established two lasting precedents for the military retirement system: (1) Army and Marine Corps officers were permitted to voluntary retire after 30 years of service (YOS) (upon approval of the President), and (2) retirement pay was set at 75% of the officer's final pay. (Though the 75% pay provision applied to Army and Marine Corps officers only, subsequent legislation in 1873 included Naval officers). Enlisted personnel were covered by legislation that was enacted in 1885, 1899, and 1907. The benefits that were provided closely followed those for officers, i.e., voluntary retirement after 30 years of service and 75% of final pay. Legislation in 1908 authorized the voluntary retirement of Navy officers after 30 years of service. [Refs. 1,2: p. VII-2,p. 146]

In 1916, legislation was again passed that had long-lasting effects on the military retirement system. Due to promotion stagnation in the officer ranks of the Navy as a result of World War I, selection boards were established for promotion to Commander,

Captain, and Rear Admiral on the basis of age-in-grade. Lieutenant commanders, commanders, and captains who reached age 45, 50, and 56, respectively, without being selected for promotion, became ineligible for further consideration and had to be retired. An officer so retired was entitled to retired pay of 2.5% of basic pay for each year of service, up to a maximum of 75% of pay. Thus, the "up-or-out" officer selection process was established. Also included in this legislation was the creation of the Fleet Naval Reserve for Navy and Marine Corps enlisted personnel. The purpose of this was to create a pool of experienced personnel who could be recalled to active duty in an emergency. Though "transferring" to the Fleet Reserve was technically different than "retiring", it basically allowed enlisted personnel to leave the Navy and Marine Corps with as little as 16 years of service (later raised to 20 YOS in 1925) and "retire" with "retainer" pay. [Refs. 1,2: p. VII-3,pp. 147 & 150]

After World War I, the Navy was again having officer stagnation promotion problems. As a result, legislation was passed which: (1) replaced the age-in-grade program with one based on service-in-grade for for grades Commander through Captain, with break points of 21, 28, and 35 years, respectively (passed in 1926); (2) extended the selection boards for promotion to Lieutenant and Lieutenant Commander (passed in 1934); and (3) provided for voluntary retirement of Naval officers after 20 years of commissioned service, at the discretion of the President (passed in 1938). [Refs. 1,2: p. VII-4,p. 148]

Legislation passed after World War II brought standardization to the military retirement provisions of the various branches of the Service. In 1945, voluntary retirement after 20 years of service was authorized for Army enlisted personnel. In 1946, legislation was enacted which permitted Navy and Marine Corps officers to

voluntarily retire after 20 years of active service[1] (including at least 10 years of commissioned service). Finally, Army and Air Force officers were authorized voluntary retirement after 20 years of active service (including 10 years of commissioned service) in 1948. Also during this period, the "up-or-out" officer selection/promotion process was standardized (1947). [Refs. 1,2: p. VII-6,pp. 148-150]

During the 1950's through 1970's, the military retirement system remained relatively unchanged. Provisions for a specific retirement system for warrant officers were passed in 1954. Legislation was passed in 1958, 1963, 1975, and 1976 that made changes in the method of recomputing retirement pay for cost-of-living adjustments.

The early 1980's followed the trend of the last thirty years. Legislation enacted in 1980, 1981, 1982, and 1983 all dealt with adjustments to retirement pay: retired pay was to be adjusted only once a year and tied to Civil Service increases (passed in 1980); final basic pay was replaced by "retainer" pay (which was the average of the last 3 years of basic pay) as the basis for retirement annuities (passed in 1980); an annual adjustment based on the percentage increase in the Consumer Price Index (CPI) was established (passed in 1981); a three-year "ceiling" was placed on CPI adjustments for fiscal years 1983-1985[2] (passed in 1982); and the "one-year look-back" save pay feature[3] was repealed (passed in 1983). Table I provides a summary of the legislation that has been discussed. [Refs. 1,2: pp. VII-7 & VII-8,p. 149]

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[1]The legislation passed in 1938 allowed Naval officers to retire after 20 years of *commissioned* service, while the legislation passed in 1946 allowed Navy and Marine Corps officers to retire with 20 years of *total active* service, only 10 years of which were required to be commissioned service.

[2]CPIs of 3.3, 3.6, and 3.3 percent, were set for FY83-FY85, respectively.

[3]The save pay feature allowed a service member to "look back" one preceding basic pay scale to compute retired pay, increased by any retired pay adjustments that occurred in the interim. This method was advantageous when the rate of retired pay adjustments exceeded increases to basic pay.

TABLE I

SUMMARY OF MILITARY RETIREMENT LEGISLATION

DATE	ACTION
1855	Authorized involuntary removal of Navy officers from active list for disability and other reasons.
1861	Authorized voluntary retirement of officers of all Services after 40 years of service, at the discretion of the President.
1861	Permitted involuntary retirement of Navy officers after 45 years of service or at age 62.
1862	Permitted involuntary retirement of Army and Marine Corps officers after 45 years or at age 62.
1870	Authorized voluntary retirement of Army and Marine Corps officers after 30 years of service, at the discretion of the President. Retirement pay for Army and Marine Corps officers was set at 75% of final pay and at 50% for Navy officers.
1878	Raised the Navy officer retirement rate to 75% of sea duty pay.
1882	Made retirement mandatory at age 64 for officers of all Services. Also gave officers a nondiscretionary right to voluntary retirement after 40 years of service. (Earlier law had authorized voluntary retirement, but had given the President the power to grant or deny such a retirement.)
1885	Authorized voluntary retirement of Army and Marine Corps enlisted personnel after 30 years of service. Retired pay was set at 75% of a member's pay, plus an allowance in lieu of quarters, fuel, and light.
1899	Authorized voluntary retirement of Navy enlisted personnel after 30 years of service. Established the "promotion flow" retirement program for Navy officers.
1907	Consolidated the 30-year voluntary retirement authority for the enlisted personnel of all branches of the Services into one status.
1908	Authorized voluntary retirement of Navy officers after 30 years of service.
1916	Created Fleet Reserve. Authorized voluntary transfer of Navy and Marine Corps enlisted personnel to Fleet Reserve after 16 years of active service.
1916	Established "up-or-out" promotion system based on age-in-grade and integrated involuntary retirement system. First to use "standard" retired pay formula of 2.5% times years-of-service, up to maximum of 75%.
1920	Provided for classification of Army officers and authorized involuntary retirement of those designated "Class B" (i.e., inefficient performance).

TABLE I

SUMMARY OF MILITARY RETIREMENT LEGISLATION (cont'd.)

DATE	ACTION
1922	Authorized involuntary retirement of Army officers chosen for elimination from active list by board officers.
1925	Raised minimum length-of-service required by Navy and Marine Corps enlisted personnel for eligibility for transfer to Fleet Reserve from 16 to 20 years.
1926	Changed integrated Navy officer promotion/involuntary retirement system from age-in-grade to service-in-grade program.
1934	Made Marine Corps officers subject to Navy rather than Army retirement laws. Brought them under Navy's promotion/involuntary retirement system. Extended the Navy's officer selection program to promotion to O-4 and O-3.
1935	Authorized voluntary retirement of Army officers after 15 years of active service.
1938	Revised the Navy's officer selection and retirement processes. O-4's to O-6's who had twice failed of selection for promotion were involuntarily retired after 26, 28, and 30 years of service, respectively. Also authorized the voluntary retirement of Navy officers after 20 years of commissioned service, at the discretion of the President.
1945	Authorized voluntary retirement of Army enlisted personnel after 20 years of active service.
1946	Authorized voluntary retirement of Navy and Marine Corps officers after 20 years of active service, including 10 years of commissioned service. Lowered mandatory retirement age from 64 to 62 for such officers. Temporarily authorized their involuntary retirement if chosen for elimination from active list by board of officers.
1947	Created Department of Air Force. Made Army retirement laws applicable to Air Force personnel.
1947	Established integrated promotion/involuntary retirement system for officers of all Services.
1948	Established retirement system for career personnel of Reserve and National Guard. Authorized voluntary retirement of Air Force and Army officers after 20 years of active service, including 10 years of commissioned service. Repealed 15-year voluntary retirement authority enacted in 1935.
1954	Established specific retirement system for warrant officers of services.

TABLE I

SUMMARY OF MILITARY RETIREMENT LEGISLATION (cont'd.)

DATE	ACTION
1958	Suspended "recomputation" method that primarily had been used to make post-retirement adjustments to retireed pay since origin of Service retirement system.
1963	Replaced recomputation method of retired pay adjustment procedure based on increases in cost-of-living.
1975	Provided that the monthly retired/retainer pay of those who became entitled to that pay on or after 1 Jan 1971 may not be less than it would have been had the member become entitled to such pay of an earlier date in that member's career (Tower Amendment).
1976	Eliminated the one percent add-on and established a semi-annual adjustment mechanism effective March 1st and Sept. 1st of each year. Percentage adjustment determined on CPI percentage increase from June to December and December to June, respectively (Chiles Amendment).
1980	Deleted the semi-annual mechanism and directed that retired pay be adjusted at the same time and by the same percentage as Civil Service pensions, contingent on annual mechanism being established for retired Civil Service.
1980	Replaced use of terminal basic pay with monthly retired or retainer pay base (average of highest three of basic pay) for determining retired or retainer pay entitlements.
1981	Established an annual adjustment mechanism for retired Civil Service employees and activated a similar feature for retired military service members, effective on March 1st of each year, as determined by the percentage increase in CPI from December to December of each year.
1982	Placed a three-year limitation on CPI adjustments during FY83 to FY85, and slipped the effective date one month during each year (April, May, June), respectively. Members age 62 or older, or disabled, receive full CPI percentage adjustments. Members under age 62 receive one-half "assumed CPI" (3.3, 3.6, 3.3 for FY83, FY84, FY85, respectively), plus the actual CPI percentage increase.
1983	Repealed the "one-year look-back" save pay feature for the calculation of initial amounts of retired/retainer pay, but (1) created a 3-year extension for those eligible to retire on 24 Sept. 1983 to use the "look back" feature, and (2) ensured that retired/retainer pay may not be less that what it would have been during the 3-year period for members eligible to retire on 24 Sept. 1983. Provided that gross retired/retainer pay be rounded to the next lower dollar amount. Provided that years-of-service creditation for calculation purposes be based on 1/12 of a year for each full month served. This terminated the six-month rounding rule for computing retired/retainer pay.

C. REVIEW OF MILITARY RETIREMENT SYSTEM STUDIES

1. *Hook Commission (1948)*

The Hook Commission (Advisory Commission on Service Pay) in 1948 was the first major study of the entire military compensation system conducted after World War II. The Commission's recommendations provided the basis for the Career Compensation Act of 1949. This legislation enacted provisions which set the framework for the current system of basic compensation, and Special and Incentive pays. In regards to military retirement, the Commission recommended: (1) that the system should be non-contributory; (2) voluntary retirement with 20 years of service at age 60 (for officers; for enlisted personnel this would drop down to age 50) or at any age with 30 years of service; (3) that there was no need to accumulate a fund; (4) that mandatory retirement for officers be no lower than age 60; (5) that severence pay be paid to those who are involuntary separated; and (6) retirement pay be 2.5% of basic pay multiplied by the years of service, not to exceed 75%. [Ref. 3]

2. *Senate Subcommittee Hearings (1958)*

Though not the results of a formal study, recommendations to change the military retirement system only for senior officers were presented by the Assistant Secretary of Defense (Manpower, Personnel, and Reserves), William Francis, to the 1958 Senate Subcommittee Hearings on military pay matters. Mr. Francis presented a plan whereby the normal retirement points for senior officers would be established as follows:

Grade	Years
O-6 through O-10	30
O-5	26
O-4 and below	20

This plan was proposed in response to the exodus of young colonels in the Air Force with 20 years of service. [Ref. 4]

3. *Gorman Committee/Randall Panel (1962)*

The Gorman Committee was a comprehensive study of the Service compensation system. No final report was ever issued; however, its findings were reviewed and (for the most part) approved by the Randall Panel. This led to the second largest Service pay raise in modern times (the largest was in fiscal year 1982). A major recommendation of this study that was enacted into law was to base adjustments to Service retired pay on the CPI rather than on changes in basic pay of active duty personnel. [Ref. 1: p.VII-16]

4. *First QRMC (1967)*

Title 37, U.S. Code, Section 1008b, required the President to initiate a quadrennial review[4] of military compensation, and to submit a comprehensive report to Congress. The First Quardrennial Review of Military Compensation (First QRMC) was convened in December 1966, with the report published in November 1967. The major recommendations of this First QRMC were: (1) a career force member should be fully paid in taxable cash, i.e., a "military salary," with deductions for taxes and any subsistence/housing furnished; (2) a career service member would contribute 6.5% of his salary to a retirement account and have a vested equity in this contribution; (3) adoption of a two-step annuity plan where the retiree begins drawing Step-1 pay percentages (24% at 20 years of service to 66% at 40 years of service) immediately upon leaving the Service, and graduating to Step-2 pay percentages (33% at 20 years

[4]There have been five quadrennial reviews conducted to date. Three of the reviews, the First/Third/Fifth, dealt with military retirement and are discussed in this thesis. The remaining two, the Second/Fourth, did not address military retirement and are, therefore, not included.

of service to 75% at 40 years of service) at age 55 to age 60, depending upon length of service at retirement; (4) integration with Social Security, with military retirement annuities to be offset by 50% of social security beefits; and (5) military retirement annuities to continue to be protected by CPI adjustments. [Ref. 5: pp. S12-S20, xvi-xviii, 3-1 to 5-5]

5. *Interagency Committee (1971)*

The Interagency Committee (IAC) on Uniformed Services Retirement and Survivor Benefits (1971) proposed extensive reform of the non-disability retirement system. The Committee's recommendations were intended to decrease costs, improve the efficiency and effectiveness of the system as a management tool, and to reduce some of the system's inequities. The major recommendations included: (1) a reduced annuity for retiring earlier than age 60 with 20-24 years of service, or at age 55 with 30 or more years of service; (2) a three-step annuity plan of 2.5% for 1-24 years of service, 3% for 25-30 years of service, and 2% for 31-35 years of service; (3) vesting at 10 years of service; and (4) a lump sum severance pay for involuntary separation after 5 years of service. [Ref. 1: p. VII-16]

6. *DoD Retirement Study Group (1972)*

The DoD Retirement Study Group (1972) was formed to review the recommendations of the Interagency Committee (IAC). The results of this study group took the form of the proposed Retirement Modernization Act (RMA), legislation that was never passed. The RMA proposed a two-step annuity plan (2.5% for 1-24 years, 3% for 25-30 years) which would be reduced by 15 percentage points for retirement with less than 30 years of service. The reduction would be lifted when the retiree reached the point where he would have had 30 years of service. The proposed Act also provided vesting at 10 years of service and severance pay after 5 years of service. [Ref. 1: p. VII-16]

7. *Third QRMC (1975-1976)*

The Third Quadrennial Review of Military Compensation (Third QRMC) took a comprehensive look at the entire military compensation system. Though ten volumes were published in 1976 that contained research and background papers, no final report was ever issued. The recommendations of the Third QRMC included: (1) comparability with Civil Service should be the standard for establishing pay; (2) the military pay and allowances system should be modernized; and (3) the previously discussed Retirement Modernization Act should replace the present retirement system. [Ref. 2: p. VII-17]

8. *Defense Manpower Commission (1974-1976)*

The Defense Manpower Commission (DMC) was created by Congress to study a large number of defense manpower issues, only one of which was military compensation. Its report published in 1976 recommended a conversion to a salary system (versus one of base pay, allowances, and incentives) and a revised retirement plan. The proposed retirement plan would allow a service member to "earn" retirement points for each year of service: 1 point for each year in a non-combat job, 1.5 points for each year in a combat job. A service member could retire between 20 and 30 years of service when 30 points were accumulated, and receive an annuity of 2.67% per retirement point multipled by the highest three years of basic pay. (Example: 22 years non-combat service equals 22 points and 4 years of combat service equals 8 points. 22 + 8 = 30 points. 30 x 2.67% = 80%.) This meant that for service members with no combat time, a full 30 years of service must be served. [Ref. 1: p. VII-16]

9. *President's Commission on Military Compensation (1977-1978)*

In 1977, President Carter established his President's Commission on Military Compensation (also referred to as the Zwick Commission), and tasked them with

reviewing "at least the analyses, findings, and recommendations related to military compensation which have been completed by the Quadrennial Reviews of Military Compensation, the Comptroller General, the Interagency Committee," and others. The Commission was tasked with making recommendations on a wide-range of military compensation issues. Inter alia, the Commission was to identify the purposes of the military retirement system, determine if the present system was effective, and to recommend appropriate changes. The Commission recommended a retirement system that provided retired annuities with as few as 10 years of service. However, the annuities could not be collected until age 55 for 30 or more years of service, age 60 for 20-29 years of service, or age 62 for 10-19 years of service. A change from a level multiplier to a three-step multiplier was also recommended: 2.00% for 1-5 years of service, 2.25% for 6-10 years of service, and 2.75% for 11-35 years of service. Other recommendations included a "high-three average" instead of final basic pay to compute the retirement annuity; reduction in military retirement pay when social security benefits commenced; adjustment of annuities through the use of a CPI change; and the establishment of a deferred compensation trust fund for each member after 5 years of service. [Ref. 6: pp. 62-70] DoD modified the Commission's retirement proposal and submitted it to Congress in 1979 as the Uniformed Services Retirement Act (USRBA). No action, however, was taken by Congress. [Ref. 1: p. VII-17]

10. *President's Private Sector Survey on Cost Control (1983)*

The President's Private Sector Survey on Cost Control (PPSS), more widely known as the Grace Commission, was formed to identify and suggest remedies for waste and abuse in the Federal government. The military retirement system was identified as an area in which cost savings could be realized. The proposed changes to the military retirement system called for: (1) no voluntary retirement before age 55; (2)

age 62 to be the earliest retirement age to receive unreduced retirement benefits; (3) reduced pension benefits between age 55 and age 62; (4) a change in the earnings base from high-3 to high-5 average; (5) a reduction in the annuity multiplier to 1.3% of Basic Military Compensation (BMC) per year of service (BMC is the sum of basic pay, basic allowance for quarters, basic allowance for subsistence, and the tax advantage gained by receiving tax-free allowances); (6) vesting after 10 years of service; (7) a decrease in COLA increases; and (8) the integration of the military retirement system with Social Security. [Ref. 7] Though mention was made that the military retirement system is used as a personnel management tool, the PPSS believed it to be of little value. It appears from the nature of the proposed recommendations that they were selected solely on the basis of cost reduction, and, in fact, did not consider manpower force requirements of the military services. [Ref. 1: p. VII-17]

11. *Fifth QRMC (1982-1984)*

Finally, in the fall of 1982, the Fifth Quadrennial Review of Military Compensation (Fifth QRMC) was organized to assess the extent to which the existing military retirement and special incentive pay systems contribute to our national defense. Contrasted to the Grace Commission's strictly "cost-reduction" view of the military retirement system, the Fifth QRMC evaluated the military retirement system from the perspective of how it supported and complemented the manpower force management requirements of the military Services. The findings, recommendations, and supporting documentation of the retirement system portion of the study were published in five volumes in early 1984. In order to strengthen the military retirement system, the Fifth QRMC recommended that consideration be given to modifying the system with one of four alternatives that recommended combinations of reduced multipliers and COLAs for early (less than 30 years) retirement. The Review further

recommended that the system should be "grandfathered," remain non-contributory, not be explicitly integrated with social security (i.e., no offset), and that vesting should remain at 20 years of service. [Ref. 1: pp. I-35 & I-36]

D. SUMMARY

The reviews of the legislative history and various studies of the military retirement system establish that the system is not solely an old-age pension system. Rather, it is an integral part of total military compensation which has been, and should continue to be, used as a force management tool. As the Fifth QRMC stated, any modification to the retirement system should "be proposed in a legislative form that recognizes the absolute requirement for an integrated proposal, and that subsequent fragmenting of the modification could negate the resultant force structure and thus cause the modification to fail its intended purpose" [Ref. 1: p. I-35]. Any modifications to the retirement system must consider this tie-in between the retirement system and force management, and potential spill over effects. Dollars that are saved by reducing benefits to retirees could be needed to pay for increased recruiting, training, and retention costs.

II. AN ECONOMIC COMPARISON AND EVALUATION

A. INTRODUCTION

As mentioned above, military retirement costs for fiscal year 1983 amounted to $15.9 billion and accounted for approximately 8% of all defense spending. The costs of this retirement system are projected by the DoD Office of the Actuary to reach over $45 billion in fiscal year 2000 [Ref. 8: p. 21]. In this chapter the component parts of the current military retirement system are described, and the costs of providing these benefits are examined. Military retirement outlays are compared to the Gross National Product (GNP) and other portions of the Federal budget. The results of analyses performed during the Fifth Quadrennial Review on Military Compensation are presented.

B. DESCRIPTION OF THE CURRENT RETIREMENT SYSTEM

The current military retirement system is comprised of four distinct, but inter-related components:

- A non-disability system for service personnel (either Regular or Reservists) who may retire from active duty after at least 20 years of service (no age limitations).
- A non-disability system for drill reservists who have completed at least 20 years of creditable service for retirement purposes. These personnel may retire at age 60.
- A disability system for service members either temporarily or permanently disabled.
- A Survivor Benefit Program (SBP).

After 20 years of active duty, a service member is eligible for immediate non-disability retirement annuities. The service member's retirement pay is equal to years-of-service (YOS) times a multiplier (2.5%) times final basic pay. (For those

entering the Services after September 8, 1980, the pay base used is high-3 average instead of final pasic pay.) A maximum of 75% of base pay may be received. Cost-of-living adjustments to retired pay are based upon the Consumer Price Index (CPI). [Refs. 1,8: pp. VI-1 to VI-3,pp. 1 & 2]

Non-disability reserve retirement provisions closely follow those of non-disability active duty retirement. Two distinct differences are involved, however:

- Years of equivalent service are earned by receiving creditable days ("points") for active duty, full-time Reserve service during annual training, drill periods, and membership in a Reserve component.
- Though a service member may retire from the Reserves any time after 20 creditable years are earned, retirement pay does not begin until age 60 [Refs. 1,8: VI-7 & VI-8,p. 3)].

Disability retirement is provided to service members unable to perform their duties. Disability retirement qualification and amount of pay are determined by length of service, disability percentage (from a Veterans Administration rating system), cause of the disability, and service member's basic pay. The disabled service member receives retired pay based upon the most advantageous level of benefit. [Refs. 1,8: pp. VI-8 & VI-9,pp. 2 & 3)]

The Survivor Benefit Program (SBP) is an optional program that provides income to surviving families of service members who die in retirement or on active duty after reaching eligibility. Service members elect a percentage of their gross retired pay to be provided to their survivors, and give up a portion of their retirement annuity in return. This is the only portion of the military retirement system where service members explicitly share the costs of the system with the government. [Ref. 8: pp. 3 & 4]

Table III presents the number of retired personnel and retirement costs broken down by component parts for fiscal years 1979 to 1983. Each component as a percentage of total retirement and SBP costs has remained *relatively* constant during

TABLE II

COMPONENTS OF THE MILITARY RETIREMENT SYSTEM

(Dollar amounts in billions of $)

	FY79	FY80	FY81	FY82	FY83
Non-disability retirees					
Active duty					
Number	974,639	1,000,685	1,019,970	1,038,084	1,052,153
Retirement pay	$ 8.41	$ 9.77	$11.24	$12.23	$13.04
	(81.8%)	(82.0%)	(81.9%)	(81.9%)	(81.9%)
Drill reservists					
Number	101,490	112,744	123,278	133,244	141,199
Retirement pay	$ .58	$ .69	$ .85	$ .96	$ 1.06
	(5.6%)	(5.8%)	(6.2%)	(6.4%)	(6.7%)
Disability retirees					
Number	152,365	151,096	145,714	142,105	140,008
Retirement pay	$ 1.09	$ 1.20	$ 1.30	$ 1.36	$ 1.38
	(10.6%)	(10.1%)	(9.5%)	(9.1%)	(8.6%)
Surviving families					
Number	57,821	65,625	74,170	77,346	85,521
SBP payments	$ .20	$ .26	$ .33	$ .39	$ .45
	(1.9%)	(2.2%)	(2.4%)	(2.6%)	(2.8%)
Total					
Number	1,286,315	1,330,150	1,363,132	1,390,779	1,418,881
Expenditures	$10.28	$11.92	$13.72	$14.92	$15.93

(Data was obtained from the DoD Statistical Reports on the Military Retirement System, FY1979 to FY1983.)

these years: active duty non-disability retired pay, 82%; drill reservists non-disability retired pay, 6-7%; disability retired pay, 9-11%; and SBP, 2-3%. (As a *percentage* of total costs, there are slight increases for drill reservists non-disability and SBP, and a

slight decrease for disability retirees.) Since the active duty non-disability retirement portion accounts for the majority of the cost of the system, it logically follows that if modifications are to be made to the retirement system in an effort to reduce costs, then this portion of it would undoubtedly produce the greatest cost savings. [Refs. 9,10,11,12,13: p. 13,p. 13,p. 13,p. 16,p. 16]

Prior to fiscal year 1985, the military retirement system was an unfunded or "pay-as-you-go" system. This funding method charges future generations of tax payers for services rendered by the military service to the current generation of tax payers. However, the DoD FY84 Authorization Act (Public Law 98-94) requires the military retirement system to be valued using accrual accounting and funded using an aggregate entry-age normal method. Under accrual accounting, **future** retirement and survivor benefits that are earned by **current** service members are accounted for and charged to the current budget. The aggregate entry-age normal method sets aside a uniform or level percentage of basic pay to provide the funds for the retirement annuities. Only each year's normal cost (plus/minus any actuarial gains or losses) will be funded by DoD. The U.S. Treasury will assume responsibility to make payments on the unfunded liability. Accrual accounting and aggregate entry-age funding should provide three improvements over the pay-as-you-go system: (1) the current year's total cost of the present military force is more accurately presented; (2) a more accurate assessment of how changes to the force structure effect future retirement costs; and (3) less emphasis on immediate retirement benefit cuts that offer only short-term savings. [Ref. 1: p. I-8]

C. MILITARY RETIREMENT COSTS VS. GNP AND FEDERAL OUTLAYS

Taken by themselves, military retirement costs certainly do appear to be excessive: a 4400% increase in the last thirty years with a fiscal year 1983 cash cost of $15.9 billion. But, how do these figures compare to other costs?

Table IV presents GNP, federal budget, defense spending, and military personnel costs for the last thirty years. Though retirement costs have steadily increased since 1954, GNP and the federal expenditures have also been rising steadily. (See Figures 2.1 - 2.3.) [Refs. 9,14,15: pp. 10 & 11]

Examining the increases in GNP and the federal outlays over the last thirty years, we find that the percentage increase in military retirements costs has, in fact, far outdistanced the others. Retirement costs have climbed 4000% since 1954. During this same period, GNP, the federal budget, defense spending, and military personnel costs have increased 875%, 1023%, 422%, and 315%, respectively.

Looking at the relationship between retirement costs, defense spending, and total federal outlays a little closer, we find that in the same period that military retirement costs have *increased* from 1% to 8% of the defense budget, defense spending has *decreased* as a percentage of the federal budget from 57% down to 26%. As a percentage of the federal budget, military retirement costs have increased roughly three and a half times from .6% to 2.0%. These increases in military retirement costs would seem to make a strong argument in favor of modifying the retirement system in order to reduce costs.

D. REASONS FOR INCREASES IN MILITARY RETIREMENT COSTS

This section briefly describes the results of analyses conducted during the Fifth Quadrennial Review on Military Compensation. Using non-disability retirement data from fiscal years 1955 to 1982, four factors were investigated to determine their influence on the increases in retirement costs. These four factors were: (1) retired population growth, (2) CPI inflation, (3) basic pay (which is used to determine retirement pay) increases in excess of inflation, and (4) retired pay adjustments (COLA). [Ref. 16: p. F-1]

TABLE III

30 YEARS OF GNP AND FEDERAL OUTLAYS

(Billions of $)

FY YEAR	GNP	FEDERAL BUDGET	DEFENSE	% OF FED. BUD.	MILPERS	% OF DEF.	RETIRED	% OF DEF.	% OF FED. BUD.
1983	3500.0	795.97	210.48	26.4	45.52	21.6	15.93	7.6	2.0
1982	3200.0	728.38	187.42	25.7	42.34	22.6	14.94	8.0	2.1
1981	2937.7	657.20	159.77	24.3	36.41	22.8	13.72	8.6	2.1
1980	2633.1	576.68	135.86	23.6	30.84	22.7	11.92	8.8	2.1
1979	2417.8	491.00	117.70	24.0	28.40	24.1	10.28	8.7	2.1
1978	2163.9	448.37	105.20	23.5	27.10	25.8	9.17	8.7	2.0
1977	1918.3	400.51	97.50	24.3	25.70	26.4	8.22	8.4	2.1
1976	1718.0	364.47	89.40	24.5	25.10	28.1	7.30	8.2	2.0
1975	1549.2	324.26	85.60	26.4	25.00	29.2	6.24	7.3	1.9
1974	1434.2	276.91	77.80	28.1	23.70	30.5	5.14	6.6	1.9
1973	1326.4	245.65	74.50	30.3	23.20	31.1	4.39	5.9	1.8
1972	1185.9	230.68	76.60	33.2	23.00	30.0	3.89	5.1	1.7
1971	1077.6	210.17	75.80	36.1	22.60	29.8	3.39	4.5	1.6
1970	992.7	195.65	78.60	40.2	23.00	29.3	2.85	3.6	1.5
1969	944.0	183.65	79.40	43.2	21.40	27.0	2.44	3.1	1.3
1968	873.4	178.13	78.80	44.2	21.95	27.9	2.09	2.7	1.2
1967	799.6	157.61	68.20	43.3	19.79	29.0	1.83	2.7	1.2
1966	756.0	134.65	54.90	40.8	16.75	30.5	1.59	2.9	1.2
1965	691.1	118.43	47.50	40.1	14.80	31.2	1.39	2.9	1.2
1964	637.7	118.58	51.50	43.4	14.20	25.9	1.01	2.0	0.9
1963	596.7	111.31	50.10	45.0	13.00	27.6	1.21	2.3	1.0
1962	565.0	106.81	49.00	45.9	13.00	26.5	0.90	1.8	0.8
1961	524.6	97.80	46.60	47.6	12.10	26.0	0.79	1.7	0.8
1960	506.5	92.22	45.20	49.0	11.70	25.9	0.69	1.5	0.7
1959	487.9	92.10	46.50	50.5	11.80	25.4	0.63	1.4	0.7
1958	449.7	82.58	44.20	53.5	11.60	26.2	0.56	1.3	0.7
1957	444.0	76.74	43.40	56.6	11.40	26.3	0.51	1.2	0.7
1956	421.7	70.46	40.10	56.9	11.60	28.9	0.48	1.2	0.7
1955	400.0	68.51	40.63	59.3	10.64	26.2	0.42	1.0	0.6
1954	366.8	70.89	40.34	56.9	10.96	27.2	0.39	1.0	0.6

(Data was obtained from the FY1983 Valuation of the Military Retirement System, and the 1983 and 1967 Economic Reports of the President.)

The analyses determined military basic pay increased by a factor of 4.8, while CPI inflation had increased by a factor of 3.6. These two factors were calculated to have accounted for approximately 76% of the increase in military retirement costs

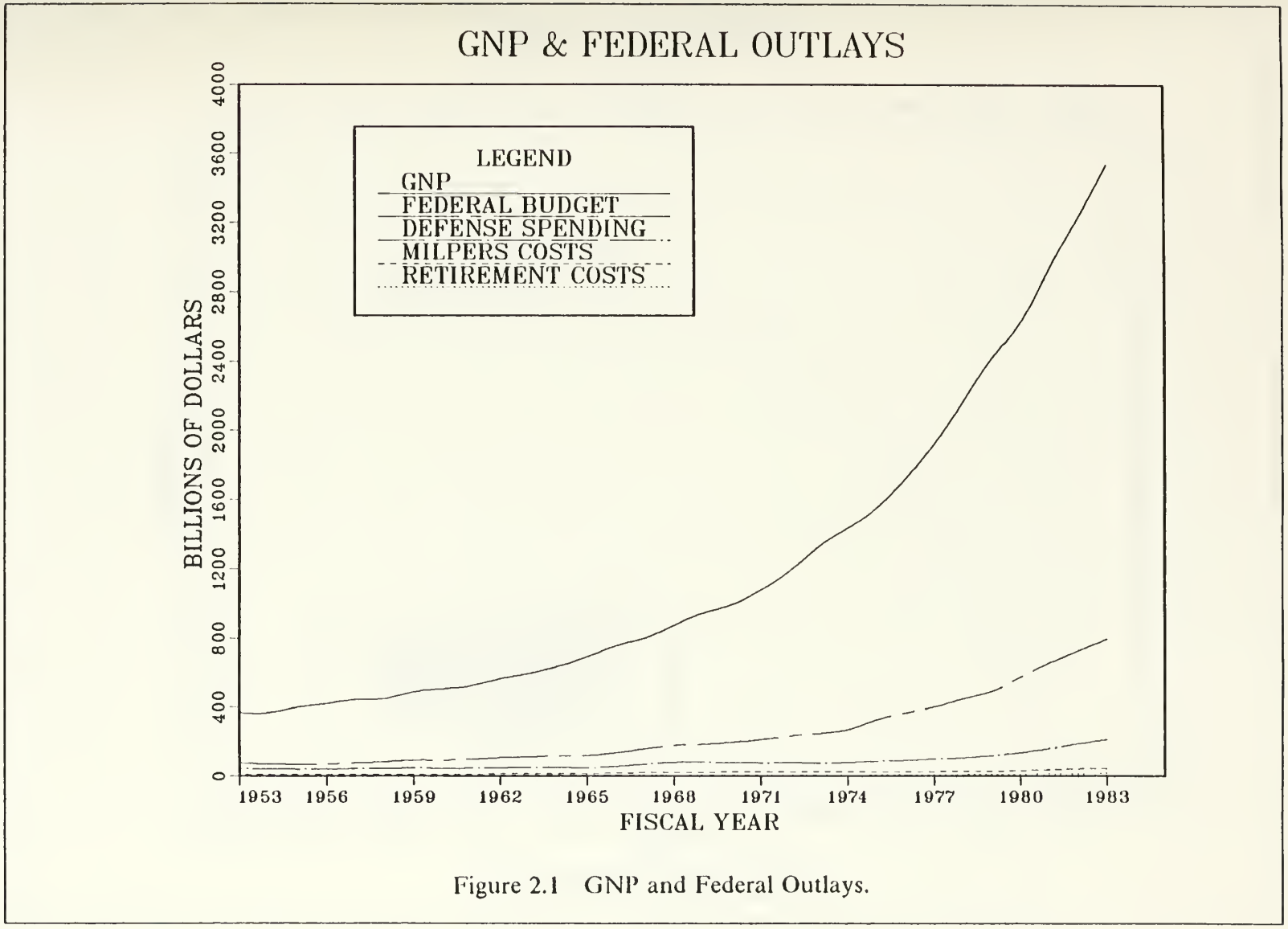

Figure 2.1 GNP and Federal Outlays.

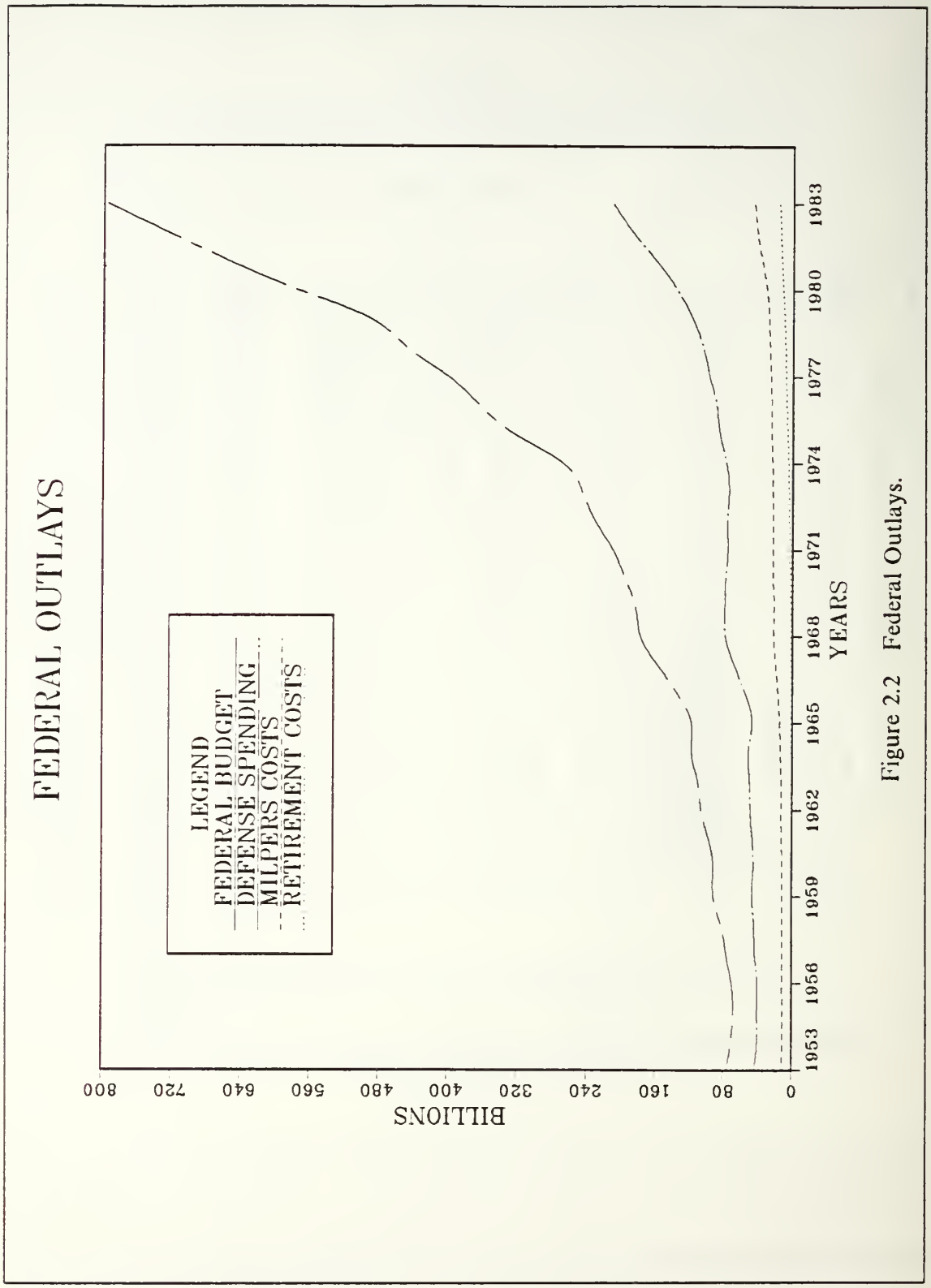

Figure 2.2 Federal Outlays.

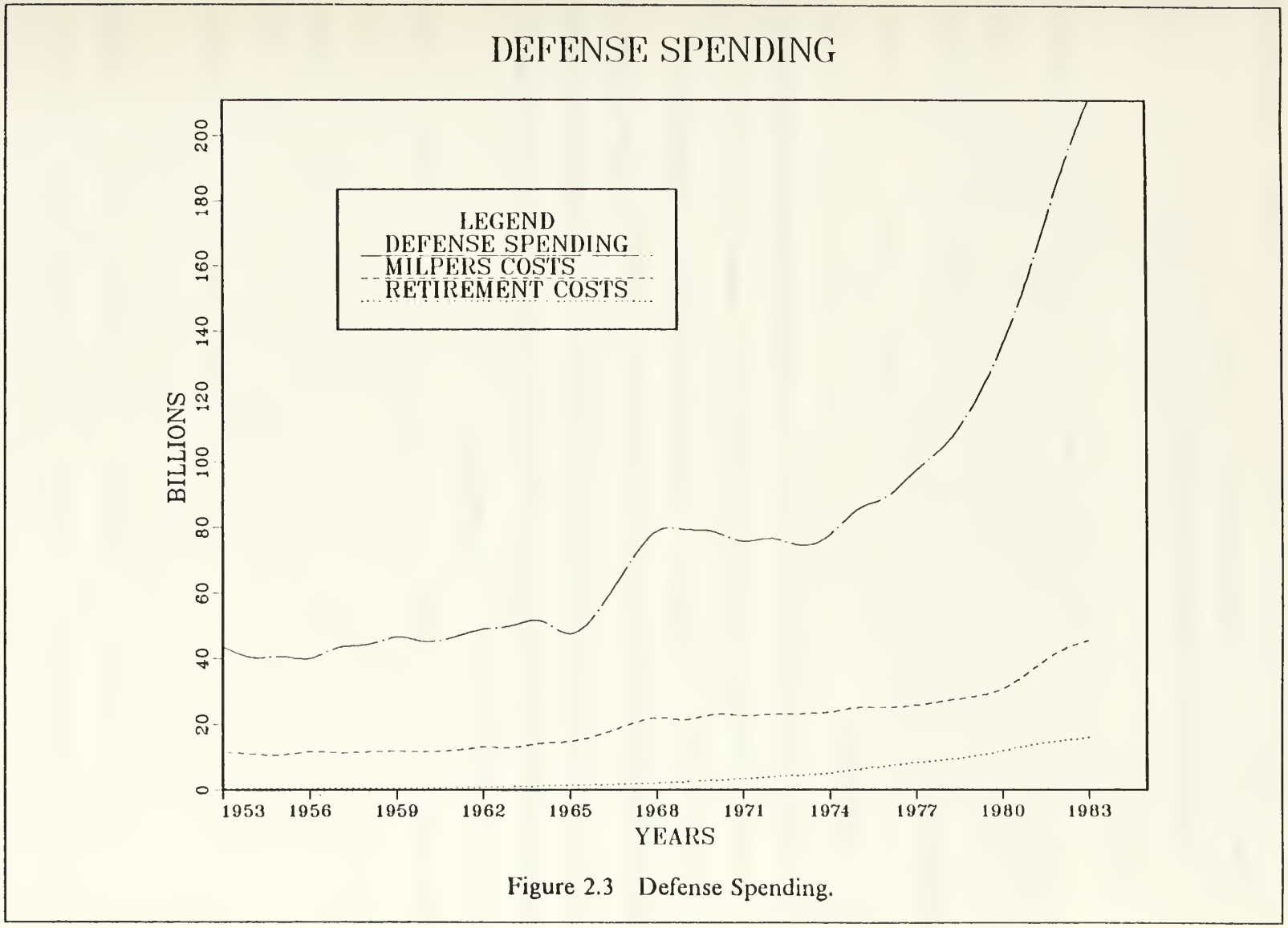

Figure 2.3 Defense Spending.

(21% - wage growth, 55% - CPI inflation). The other two factors, increases in the retired population and COLA adjustments to retired pay, were responsible for 19% and 5%, respectively, of the remaining 24% increase in costs. [Refs. 1,16: p. VIII-7,pp. F-1 to F-11]

It was also determined that changes in officer/enlisted mix, changes in grade/rank/years-of-service (YOS) at retirement, mortality improvements, and the establishment of paygrades E8/E9 were not major factors for the increases in retirement costs. [Refs. 1,16: p. VIII-7,p. F-9]

E. SUMMARY

Whether considered alone or whether they are compared to other federal outlays, the costs of the military retirement system have grown tremendously. In the last thirty years alone, as a percentage of total federal expenditures, retirement costs have increased over three-fold. There is no doubt that these costs will continue to grow and become an even greater percentage of the federal and defense budgets. As the major portion of military retirement costs, non-disability retirement provisions appear to be the likely candidates for cost-saving measures.

III. MILRET COMPUTER PROGRAM

A. BACKGROUND

The MILRET computer program is a major revision of the ENTRYAGE computer Model that was developed in 1983 at the Naval Postgraduate School as part of a thesis. The ENTRYAGE model is an 750-line Waterloo BASIC language program that was used to perform a sensitivity analysis on both individual and aggregate entry-age normal retirement cost methods under differing economic, managerial, and legal assumptions. However, only active duty non-disability retirement costs were included in the program. [Ref. 17]

At the request of the Office of the Assistant Secretary of Defense (Manpower, Logistics, and Reserve Affairs), an effort was initiated to revise the ENTRYAGE program to produce results comparable to those of the Military Retirement System Projection and Actuarial Valuation Program (GORGO) developed by the DoD Actuary. This 3000-line FORTRAN language program has the capability to make dynamic, transitional, and steady-state projections. GORGO is an extremely detailed program that encompasses all aspects of the military retirement system: non-disability, disability, active and reserve, officers and enlisted personnel, and SBP population and cost. Input for this program is provided by another DoD Actuary program, the Annualized Cost of Leaving (ACOL) model. [Refs. 1,8: pp. IX-24 & IX-25,pp. 9 & 10]

The revisions to the original ENTRYAGE model were to include: (1) reserve, disability, and SBP provisions in the algorithms; (2) make the program more "user-friendly" and interactive; (3) produce "cleaner" output; and (4) have the capability to access external data bases. Consideration was also to be given to recode the

ENTRYAGE program to either Pascal or Interactive Financial Planning System (IFPS).

As work progressed, it became obvious that the GORGO program was of a much higher level of sophistication than the ENTRYAGE computer model. In fact, for the Fifth Quadrennial Review of Military Compensation, two additional computer programs were written to provide data inputs to GORGO. In all, five separate computer programs were utilized to analyze military retirement costs and the impact of various alternatives. The experience, talent, and time required to develop the ENTRYAGE model into something comparable to GORGO were beyond the scope of the author.

B. REVISIONS

The changes made to the ENTRYAGE model have been extensive. The ENTRYAGE model has been almost completely rewritten and the new program has, therefore, been renamed as the MILRET (Military Retirement) program. Major revisions to the original ENTRYAGE model include:

- Internal documentation of the program.
- Development of "call-able" procedures and functions (features of Waterloo BASIC) to replace approximately 75 "GOTO" and "GOSUB" statements.
- Extensive use of menus to provide a more user-friendly environment

The revisions to the ENTRYAGE model have resulted in over 1300 lines of code for the MILRET program. Since Waterloo BASIC includes functions and procedures, the decision was made to remain with that language. No algorithms were developed for reserve, disability, or SBP provisions, nor was the capability to access external data bases included.

C. INSTRUCTIONS

Use of the MILRET is relatively simple and straightford. To enter the Waterloo BASIC environment on the IBM System 3033, the following steps are required:

1. "WBASIC" <ENTER>
2. "OLD MILRET <ENTER>
3. "RUN" <ENTER>

Do not include the quotation marks, only what is contained between them. After a few moments while the program is loading, a message will appear with the MILREP name. Shortly thereafter, a Main Menu is presented from which to choose the following:

1. Program Description
2. Enter/Change Data and Actuarial Assumptions
3. Individual Entry-Age Method
4. Aggregate Entry-Age Method
5. Expanded Multi-Year Individual Cost Method
6. Exit Program

It is recommended for the first time user to start with the program description, followed by a review of the data and actuarial assumptions contained in the program. Appendix C contains listings of the various menus that are displayed and some sample inputs.

APPENDIX A

MILRET COMPUTER PROGRAM (VERSION 2.0)

```
00010!*********************************************************************
00020!*                  MILRET Pension Cost Program                      *
00030!*     This is a three part interactive program that calculates      *
00040!*  non-disability military retirement costs. The three parts of     *
00050!*  the program are (1) individual entry-age cost method calcula-    *
00060!*  tion, (2) aggregate entry-age cost method, and (3) a multi-      *
00070!*  year expanded individual cost method. Program data has been      *
00080!*  derived from Department of Defense sources, and considers        *
00090!*  1983 to be the current year.                                     *
00100!*********************************************************************
00110
00120!*********************************************************************
00130!*                         OPTION Statements
00140!*     The option statement is used to inform the Waterloo BASIC     *
00150!*  system of certain global information to be used to the control   *
00160!*  the execution of the program:                                    *
00170!*   prompt: A '?' is displayed on the terminal when data is input   *
00180!*   base 1: Establishes '1' as the lower extent of all matrices     *
00190!*   lprec:  Numbers have 16 digits of precision (long precision) .*
00200!*********************************************************************
00210 option prompt, base 1, lprec
00220
00230!*********************************************************************
00240!*                          RESTORE Statement                        *
00250!*    Restores the data-list conceptual pointer to the first item    *
00260!*  in the first data statement of the program.                       *
00270!*********************************************************************
00280 restore
00290
00300!*********************************************************************
00310!*              Actuarial and economic assumptions                   *
00320!*********************************************************************
00330 current_year = 1983          %    annuity_multiplier = .025
00340 cola = .05                   %    max_percent_of_pay = .75
00350 salary_scale_incr = .055     %    off_retire_prob = .40
00360 annual_disc_rate = .06       %    enl_retire_prob = .12
00370
00380!*********************************************************************
00390!*      The opening credit is first displayed, followed by the       *
00400!*   program's main menu. The operator's selection is checked to     *
00410!*   determine if the operator desires to terminate the program.     *
00420!*   If the program continues on, the appropriate procedure is       *
00430!*   called. Finally, if an invalid selection number has been        *
00440!*   entered, an error message is printed and the main menu is       *
00450!*   re-displayed to the operator.                                   *
00460!*********************************************************************
```

```
00470 call dimension_matrices
00480 call read_in_data
00490
00500 call milret_program_opening_credit
00510 main_menu_selection$='0'
00520 while (main_menu_selection$<>'6')
00530    call display_main_menu
00540    on ioerr ignore
00550    input main_menu_selection$
00560    if main_menu_selection$='6'
00570       call exit_program_message
00580    elseif main_menu_selection$='1'
00590       call program_description
00600    elseif main_menu_selection$='2'
00610       call enter_data
00620    elseif main_menu_selection$='3'
00630       call individual_entry_age_normal
00640    elseif main_menu_selection$='4'
00650       call aggregate_entry_age_normal
00660    elseif main_menu_selection$='5'
00670       call expanded_multi_year_individual_normal
00680    else
00690       call main_menu_error_message
00700    endif
00710 endloop
00720
00730!*********************************************************************
00740!*             PROCEDURE milret_program_opening_credit               *
00750!*********************************************************************
00760 proc milret_program_opening_credit
00770 print chr$(12)
00780 print % print % print % print
00790 print % print % print % print
00800 print
00870 print tab(14);'       MILRET PROGRAM  (Version 2.0, 1985)'
00880 print
00890 print tab(14);'Developed at Naval Postgraduate School, Monterey, CA
00900 print
00910 print tab(14);'        (Please wait - program is loading.)'
00920 for i = 1 to 30000
00930 next i
00940 endproc  !(* entryage_program_opening_credit *)
00950!*********************************************************************
00960
01010!*********************************************************************
01020!*                 PROCEDURE dimension_matrices                      *
01030!*         The various data matrices are dimensioned.                *
01040!*********************************************************************
01050 proc dimension_matrices
01060 dim current_year_basepay(26,6)
01070 dim prior_year_basepay(26,6)
01080 dim enl_nondis_retired_mortality(31)
01090 dim off_nondis_retired_mortality(31)
01100 dim avg_los_for_retired_grade(26)
01110 dim avg_age_for_retired_grade(26)
01120 dim target_retired_grade_prob(26)
01130 dim enlisted_accession(32)
01140 dim officer_accession(32)
01150 endproc  !(* dimension_matrices *)
01160!*********************************************************************
```

```
01170
01220!*************************************************************************
01230!*                      PROCEDURE read_in_data                           *
01240!*        The various data matrices are read from the program            *
01250!*     into internal storage for use in the calculations.                *
01260!*************************************************************************
01270 proc read_in_data
01280 read mat current_year_basepay
01290 read mat prior_year_basepay
01300 read mat enl_nondis_retired_mortality
01310 read mat off_nondis_retired_mortality
01320 read mat avg_los_for_retired_grade
01330 read mat avg_age_for_retired_grade
01340 read mat target_retired_grade_prob
01350 read mat enlisted_accession
01360 read mat officer_accession
01370 endproc  !(* read_in_data *)
01380!*************************************************************************
01390
01450!*************************************************************************
01460!*                          1983 pay data                                *
01470!*      There is a value in this matrix (and the one below) for          *
01480!*    each of the 26 paygrades (e1-e9, w1-w4, o1, o1e, o2, o2e,          *
01490!*    o3, o3e, and o4-o10) in 2-year increments from 20 years to         *
01500!*    30+ years of military service.                                     *
01510!*************************************************************************
01520!       20 yrs.    22 yrs.    24 yrs.    26 yrs.    28 yrs.   30+ yrs.
01530 data    573.6,     573.6,     573.6,     573.6,     573.6,     573.6
01540 data    642.9,     642.9,     642.9,     642.9,     642.9,     642.9
01550 data    762.3,     762.3,     762.3,     762.3,     762.3,     762.3
01560 data    888.6,     888.6,     888.6,     888.6,     888.6,     888.6
01570 data   1102.8,    1102.8,    1102.8,    1102.8,    1102.8,    1102.8
01580 data   1299.3,    1299.3,    1299.3,    1299.3,    1299.3,    1299.3
01590 data   1483.5,    1583.1,    1583.1,    1779.9,    1779.9,    1779.9
01600 data   1681.2,    1779.9,    1779.9,    1978.5,    1978.5,    1978.5
01610 data   1917.9,    2019.0,    2019.0,    2215.2,    2215.2,    2215.2
01620 data   1660.8,    1660.8,    1660.8,    1660.8,    1660.8,    1660.8
01630 data   1789.8,    1862.4,    1862.4,    1862.4,    1862.4,    1862.4
01640 data   1994.1,    2066.4,    2066.4,    2139.3,    2139.3,    2139.3
01650 data   2267.7,    2243.6,    2243.6,    2526.0,    2526.0,    2526.0
01660 data   1382.4,    1382.4,    1382.4,    1382.4,    1382.4,    1384.2
01670 data   1716.6,    1716.6,    1716.6,    1716.6,    1716.6,    1716.6
01680 data   1752.6,    1752.6,    1752.6,    1752.6,    1752.6,    1752.6
01690 data   2029.2,    2029.2,    2029.2,    2029.2,    2029.2,    2029.2
01700 data   2361.9,    2361.9,    2361.9,    2361.9,    2361.9,    2361.9
01710 data   2397.3,    2397.3,    2397.3,    2397.3,    2397.3,    2397.3
01720 data   2731.2,    2731.2,    2731.2,    2731.2,    2731.2,    2731.2
01730 data   3155.7,    3266.1,    3266.1,    3266.1,    3266.1,    3266.1
01740 data   3488.4,    3690.9,    3690.9,    4002.9,    4002.9,    4002.9
01750 data   4555.8,    4555.8,    4555.8,    4555.8,    4555.8,    4555.8
01760 data   4791.6,    4791.6,    4791.6,    4791.6,    4791.6,    4791.6
01770 data   4791.6,    4791.6,    4791.6,    4791.6,    4791.6,    4791.6
01780 data   4791.6,    4791.6,    4791.6,    4791.6,    4791.6,    4791.6
01790!*************************************************************************
01800
01830!*************************************************************************
01840!*                          1982 pay data                                *
01850!*************************************************************************
01860!       20 yrs.    22 yrs.    24 yrs.    26 yrs.    28 yrs.    30 yrs.
01870 data    551.4,     551.4,     551.4,     551.4,     551.4,     551.4
```

```
01880 data   618.3,    618.3,    618.3,    618.3,    618.3,    618.3
01890 data   732.9,    732.9,    732.9,    732.9,    732.9,    732.9
01900 data   854.4,    854.4,    854.4,    854.4,    854.4,    854.4
01910 data  1060.5,   1060.5,   1060.5,   1060.5,   1060.5,   1060.5
01920 data  1249.2,   1249.2,   1249.2,   1249.2,   1249.2,   1249.2
01930 data  1426.5,   1522.2,   1522.2,   1711.5,   1711.5,   1711.5
01940 data  1616.4,   1711.5,   1711.5,   1902.3,   1902.3,   1902.3
01950 data  1844.1,   1941.3,   1941.3,   2130.0,   2130.0,   2130.0
01960 data  1596.9,   1596.9,   1596.9,   1596.9,   1596.9,   1596.9
01970 data  1721.1,   1790.7,   1790.7,   1790.7,   1790.7,   1790.7
01980 data  1917.3,   1986.9,   1986.9,   2057.1,   2057.1,   2057.1
01990 data  2180.4,   2253.6,   2253.6,   2428.8,   2428.8,   2428.8
02000 data  1329.3,   1329.3,   1329.3,   1329.3,   1329.3,   1329.3
02010 data  1650.6,   1650.6,   1650.6,   1650.6,   1650.6,   1650.6
02020 data  1685.1,   1685.1,   1685.1,   1685.1,   1685.1,   1685.1
02030 data  1951.2,   1951.2,   1951.2,   1951.2,   1951.2,   1951.2
02040 data  2271.0,   2271.0,   2271.0,   2271.0,   2271.0,   2271.0
02050 data  2305.2,   2305.2,   2305.2,   2305.2,   2305.2,   2305.2
02060 data  2626.2,   2626.2,   2626.2,   2626.2,   2626.2,   2626.2
02070 data  3034.2,   3140.4,   3140.4,   3140.4,   3140.4,   3140.4
02080 data  3354.3,   3349.0,   3349.0,   3849.0,   3849.0,   3849.0
02090 data  4176.0,   4176.0,   4176.0,   4176.0,   4176.0,   4176.0
02100 data  4176.0,   4176.0,   4176.0,   4176.0,   4176.0,   4176.0
02110 data  4176.0,   4176.0,   4176.0,   4176.0,   4176.0,   4176.0
02120 data  4176.0,   4176.0,   4176.0,   4176.0,   4176.0,   4176.0
02130!*****************************************************************
02140
02170!*****************************************************************
02180!*         Enlisted non-disability retired life expectations      *
02190!*    Thirty-one life expectations for ages 35 to 65 years old.   *
02200!*****************************************************************
02210 data 37.47, 36.57, 35.67, 34.77, 33.86, 32.95, 32.04, 31.14, 30.24
02220 data 29.34, 28.46, 27.59, 26.73, 25.88, 25.04, 24.22, 23.41, 22.62
02230 data 21.86, 21.10, 20.36, 19.62, 18.90, 18.18, 17.47, 16.78, 16.10
02240 data 15.44, 14.79, 14.16, 13.54
02250!*****************************************************************
02255
02260!*****************************************************************
02270!*           Officer non-disability retired life expectations     *
02280!*   Thirty-one life expectations for ages 35 to 65 years old.    *
02290!*****************************************************************
02300 data 40.90, 39.97, 39.04, 38.13, 37.20, 36.28, 35.37, 34.45, 33.54
02310 data 32.63, 31.73, 30.83, 29.94, 29.06, 28.18, 27.31, 26.45, 25.60
02320 data 24.75, 23.91, 23.09, 22.27, 21.46, 20.65, 19.87, 19.08, 18.31
02330 data 17.55, 16.81, 16.07, 15.35
02340!*****************************************************************
02360
02370!*****************************************************************
02380!*                      Average LOS data                          *
02390!*  NOTE: There is an entry in this matrix (and the two below)    *
02400!*        for e1-e9, w1-w4, o1, o1e, o2, o2e, o3, o3e, and       *
02410!*        o4-o10. Therefore, there are twenty-six data entries.  *
02420!*****************************************************************
02430 data 20.8,  20.4,  20.8,  21.0,  21.0,  21.0,  21.8,  22.7,  24.3
02440 data 22.1,  22.7,  23.1,  22.7,  21.9,  21.9,  22.5,  22.5,  24.1
02450 data 24.1,  24.2,  24.9,  28.0,  29.9,  30.4,  30.4,  30.4
02460!*****************************************************************
02480
```

```
02500!*********************************************************************
02510!*                  Average age at retirement data                   *
02520!*    26 average retirement ages for each  of the 26 paygrades.      *
02530!*********************************************************************
02540 data 38.8,  39.8,  40.6,  40.7,  40.5,  40.0,  40.9,  41.3,  42.9
02550 data 43.0,  44.1,  42.2,  47.1,  43.1,  43.1,  44.0,  44.0,  43.6
02560 data 43.6,  44.4,  46.3,  50.5,  53.0,  56.2,  58.1,  59.8
02570!*********************************************************************
02580
02590!*********************************************************************
02600!*           Target retirement grade probability data                *
02610!*    26 probabilities of retiring in a particular paygrades.        *
02620!*********************************************************************
02630 data .0001,  .0001,  .0023,  .0128,  .0578,  .2734,  .4229,  .1010
02640 data .0546,  .0050,  .0170,  .0102,  .0129,  .0003,  .0003,  .0044
02650 data .0044,  .0252,  .0252,  .3926,  .3299,  .2586,  .0020,  .0138
02660 data .0030,  .0006
02670!*********************************************************************
02680
02690!*********************************************************************
02700!*                   Enlisted accession data                         *
02710!*  Contains 32 enlisted accession rates for the years 1951-1982.    *
02720!*********************************************************************
02730 data 202.4,  171.4,   88.1,   54.9,  121.4,  112,   80.4,   89.7
02740 data  86.4,   91.4,   94.2,  107.4,   85.3,  95.0,  94.3,  145.7
02750 data 101.1,  122.8,  147.1,  100.2,   78.7,  89.2,  99.0,   83.6
02760 data  89.7,   99.2,  104.7,   70.1,   65.6,  75.1,  79.1,   63.9
02770!*********************************************************************
02780
02800!*********************************************************************
02810!*                   Officer accession data                          *
02820!*  Contains 32 officer accession rates for the years 1951-1982.     *
02830!*********************************************************************
02840 data  8.0,   9.0,  11.9,  11.4,   9.7,   8.8,  13.4,   8.9
02850 data  8.9,  11.0,   8.6,  11.9,  10.5,   9.8,  10.9,  11.0
02860 data 13.0,  13.1,  13.6,   3.5,   9.5,  11.1,   7.6,   6.0
02870 data  6.5,   6.6,   6.6,   6.1,   7.0,   6.8,   7.5,   7.0
02880!*********************************************************************
02885
02890!*********************************************************************
02900!*                    PROCEDURE display_main_menu                    *
02910!*  Displays a main menu from which to make a program selection.     *
02920!*********************************************************************
02930 proc display_main_menu
02940 print chr$(12)
02950 print tab(23);'Military Pension Costs'
02960 print
02970 print tab(10);'    This is a three-part interactive program that
02980 print tab(10);'calculates individual, aggregate, and multi-year
02990 print tab(10);'retirement costs.  Choose a selection from the'
03000 print tab(10);'following list of options:'
03010 print
03020 print tab(12);'1. Program description'
03030 print
03040 print tab(12);'2. Enter/change data and actuarial assumptions'
03050 print
03060 print tab(12);'3. Individual entry-age cost method'
03070 print
03080 print tab(12);'4. Aggregate entry-age cost method'
03090 print
```

```
03100 print tab(12);'5. Expanded multi-year individual cost method'
03110 print
03120 print tab(12);'6. Exit program'
03130 print
03140 print ' Type in your selection number and press the <enter> key.'
03150 endproc  !(* display_main_menu *)
03160!*****************************************************************
03170
03210!*****************************************************************
03220!*                  PROCEDURE exit_program_message                *
03230!*     Prints a message upon exiting the entryage program.        *
03240!*****************************************************************
03250 proc exit_program_message
03260 print chr$(12)
03270 print
03280 print
03290 print '                   Program has been exited. Type in "bye" '
03300 print '                and press the <enter> key to return to the'
03310 print '                CMS environment.'
03320 print % print % print % print % print % print % print % stop
03330 endproc  !(* exit_program_message *)
03340!*****************************************************************
03350
03390!*****************************************************************
03400!*                PROCEDURE main_menu_error_message               *
03410!*   This procedure prints an error message when called.          *
03420!*****************************************************************
03430 proc main_menu_error_message
03440 print chr$(12)
03450 print % print % print
03460 print % print % print
03470 print % print % print
03480 print
03490 print tab(16); '  You have made an incorrect selection. A number'
03500 print tab(16); 'from 1 to 6 must be entered in order to proceed.'
03510 print tab(16); 'Please input an appropriate number when the main'
03520 print tab(16); 'menu returns to the screen.'
03530 print % print % print
03540 print tab(30); 'Please press <enter> to return to main menu.'
03550 input nothing$
03560 endproc  !(* main_menu_error_message *)
03570!*****************************************************************
03580
03610!*****************************************************************
03620!*                 PROCEDURE program_description                  *
03630!*****************************************************************
03640 proc program_description
03650 print chr$(12)
03660 print tab(27); 'MILRET Description'
03670 print
03680 print tab(10); &
03690 & '   Welcome to the MILRET program.  This program was developed'
03700 print tab(10); &
03710 & 'at the Naval Postgraduate School in 1983 and revised in 1985.'
03720 print tab(10); &
03730 & 'The program utilizes three variations of the entry-age normal'
03740 print tab(10); &
03750 & 'method of determining retirement costs:'
03760 print
```

```
03770 print tab(22); '1. Individual entry age normal'
03780 print tab(22); '2. Aggregate entry age normal'
03790 print tab(22); '3. Multi-year expanded individual'
03800 print
03810 print tab(10); &
03820 & '   The individual subprogram produces detailed information at'
03830 print tab(10); &
03840 & 'the individual paygrade and year of service entry level.'
03850 print tab(10); &
03860 & 'Retirement costs are computed from user-supplied information'
03870 print tab(10); &
03880 & 'and internally stored data. Some of the actuarial and economic'
03890 print tab(10); &
03900 & 'assumptions may be changed by the operator.'
03910 print % print % print
03920 print tab(40); 'Please press <enter> to continue ===>'
03930 input nothing$
03940 print chr$(12)
03950 print tab(27); 'MILRET Description (cont.)'
03960 print
03970 print tab(10); &
03980 & '   The aggregate subprogram requires the operator to input all'
03990 print tab(10); &
04000 & 'of the data. The information stored within the program is not'
04010 print tab(10); &
04020 & 'available to this subprogram. There are no "hardwired" prob-'
04030 print tab(10); &
04040 & 'ability assumptions.'
04050 print
04060 print tab(10); &
04070 & '   The multi-year expanded individual subprogram computes both'
04080 print tab(10); &
04090 & 'normal costs and total retirement costs for years 1953 through'
04100 print tab(10); &
04110 & '1982. This subprogram utilizes user-provided data and stored'
04120 print tab(10); &
04130 & 'information. The operator may select from a "summary" or a'
04140 print tab(10); &
04150 & '"detail" presentation of the retirement cost calculations.'
04160 print
04170 print tab(10); &
04180 & '   When you are returned to the main menu, please select from'
04190 print tab(10); &
04200 & 'the options listed. If this is your first time with this pro-'
04210 print tab(10); &
04220 & 'gram, you may want to review the assumptions first.'
04230 print % print % print
04240 print tab(30); 'Please press <enter> to return to main menu.'
04250 input nothing$
04260 endproc  !(* program_description *)
04270!*********************************************************************
04280
04330!*********************************************************************
04340!*                      PROCEDURE enter_data                         *
04350!*********************************************************************
04360 proc enter_data
04370 max_cola = 0.20   %   min_cola = 0.00
04380 max_ssi  = 0.15   %   min_ssi  = 0.00
04390 max_adr  = 0.20   %   min_adr  = 0.00
04400 max_am   = 0.05   %   min_am   = 0.01
```

```
04410 max_pbp  = 0.80   %   min_pbp  = 0.25
04420 max_por  = 1.00   %   min_por  = 0.01
04430 max_per  = 1.00   %   min_per  = 0.01
04440 data_sel$='0'
04450 on ioerr ignore   %   on conv ignore
04460 while (data_sel$<>'8')
04470    call print_data_menu
04480    input data_sel$
04490    if data_sel$='1'
04500       print tab(05); 'Enter the new value for cola (e.g., .052).'
04510       input new_c   %   flag=io_status
04520       call numeric_value_check(new_c,max_cola,min_cola)
04530       if ((new_c<=max_cola) and (new_c>=min_cola)) and (flag<>8)
04540         cola = new_c
04550       endif
04560    elseif data_sel$='2'
04570       print tab(05); 'Enter the new salary increase (e.g., .045).'
04580       input new_ssi   %   flag=io_status
04590       call numeric_value_check(new_ssi,max_ssi,min_ssi)
04600       if ((new_ssi<=max_ssi) and (new_ssi> min_ssi))and (flag<>8)
04610         salary_scale_incr = new_ssi
04620       endif
04630    elseif data_sel$='3'
04640       print tab(05); &
04650       & 'Enter the new annual discount rate (e.g., .075).'
04660       input new_adr   %   flag=io_status
04670       call numeric_value_check(new_adr,max_adr,min_adr)
04680       if ((new_adr<=max_adr) and (new_adr>=min_adr)) and (flag<>8)
04690         annual_disc_rate = new_adr
04700       endif
04710    elseif data_sel$='4'
04720       print tab(05); &
04730       & 'Enter the new multiplier (e.g., .015).'
04740       input new_am    %   flag=io_status
04750       call numeric_value_check(new_am,max_am,min_am)
04760       if ((new_am<=max_am) and (new_am>=min_am)) and (flag<>8)
04770         annuity_multiplier = new_am
04780       endif
04790    elseif data_sel$='5'
04800       print tab(05); &
04810       & 'Enter the new maximum % of basic pay (e.g., .60).'
04820       input new_pbp   %   flag=io_status
04830       call numeric_value_check(new_pbp,max_pbp,min_pbp)
04840       if ((new_pbp<=max_pbp) and (new_pbp>=min_pbp)) and (flag<>8)
04850         max_percent_of_pay = new_pbp
04860       endif
04870    elseif data_sel$='6'
04880       print 'Enter probability of new officer entrant retiring.'
04890       input new_por   %   flag=io_status
04900       call numeric_value_check(new_por,max_por,min_por)
04910       if ((new_por<=max_por) and (new_por>=min_por)) and (flag<>8)
04920         off_retire_prob = new_por
04930       endif
04940    elseif data_sel$='7'
04950       print 'Enter probability of new enlisted entrant retiring.'
04960       input new_per   %   flag=io_status
04970       call numeric_value_check(new_per,max_per,min_per)
04980       if ((new_per<=max_per) and (new_per>=min_per)) and (flag<>8)
04990         enl_retire_prob = new_per
05000       endif
```

```
05010    endif
05020 endloop
05030 endproc  !(* enter_data *)
05040 !*****************************************************************
05045
05050 !*****************************************************************
05060 !*                "SUB" PROCEDURE numeric_value_check            *
05070 !*       This procedure checks that the value input is a valid    *
05080 !*   numeric value.  If not, an error message is displayed.       *
05090 !*****************************************************************
05100 proc numeric_value_check(new_value,max_value,min_value)
05110 s=io_status
05120 if s=8
05130    print chr$(12) % print % print % print % print % print
05140    print tab(15); &
05150    & "   You have entered an alpha-numeric vs. numeric value."
05160    print using "              Only numeric values from #.###" +&
05170    & " to #.### may be entered.",min_value,max_value
05180    print % print % print % print tab(15); &
05190    & "       Please press <enter> to return to the Data Menu ==>"
05200    input nothing$
05210 elseif (new_value < min_value) or (new_value > max_value)
05220    print chr$(12) % print % print % print % print % print
05230    print tab(15); &
05240    & "   The value you have entered is outside the range"
05250    print tab(15); &
05260    & "of allowable values.  Please input a numeric value"
05270    print using "              between #.### and #.### for your" +&
05280    & " entry.",min_value,max_value
05290    print % print % print % print tab(15); &
05300    & "       Please press <enter> to return to the Data Menu ==>"
05310    input nothing$
05320 endif
05330 endproc  !(* numeric_value_check *)
05340 !*****************************************************************
05350
05370 !*****************************************************************
05380 !*               "SUB" PROCEDURE print_data_menu                 *
05390 !*****************************************************************
05400 proc print_data_menu
05410 cola$ = '               1. COLA = .###'
05420 salary$ = '               2. Salary scale increase = .###'
05430 discount$ = '               3. Annual discount rate = .###'
05440 multiplier$ = '               4. Annuity multiplier = .###'
05450 most$ = '               5. Maximum percentage of base pay = .###'
05460 oprob$ = '               6. Officer retirement probability = .###'
05470 eprob$ = '               7. Enlisted retirement probability = .###'
05480 exit$ = '               8. No changes or changes are complete'
05490 print chr$(12)
05500 print tab(30); 'MILRET Data'
05510 print tab(10); &
05520 & '   The following actuarial and economic values are currently'
05530 print tab(10); &
05540 & 'stored within the MILRET program. To change a value, type'
05550 print tab(10); &
05560 & 'in the selection number first (i.e., from 1 to 7) and press'
05570 print tab(10); &
05580 & '<enter>. When the prompt appears, type in the new value as a'
05590 print tab(10); &
05600 & 'decimal (e.g., .065) and press <enter> again. Repeat this as'
```

```
05610 print tab(10); &
05620 & 'often as necessary. Enter an "8" to return to the main menu.'
05630 print
05640 print using cola$,cola
05650 print using salary$,salary_scale_incr
05660 print using discount$,annual_disc_rate
05670 print using multiplier$,annuity_multiplier
05680 print using most$,max_percent_of_pay
05690 print using oprob$,off_retire_prob
05700 print using eprob$,enl_retire_prob
05710 print exit$
05720 print
05730 print tab(40); 'Please input a number and press <enter>.'
05740 endproc  !(* print_data_menu *)
05750 !*****************************************************************
05760
05770 !*****************************************************************
05780 !*             PROCEDURE individual_entry_age_normal             *
05790 !*****************************************************************
05800 proc individual_entry_age_normal
05820 call individual_subprogram_credit
05830 call input_individual_data
05840 call determine_year_factor
05860 curr_pay_for_retired_grade = current_year_basepay(g,y)
05870 retirement_year = entry_year + los
05880 number_of_years_to_retirement = (retirement_year - current_year)
05890 sal_incr = salary_scale_incr
05900 curpay = curr_pay_for_retired_grade
05910 percentage_of_pay = los * annuity_multiplier
05930 projected_monthly_retirement_basepay = &
05940 &  fn_future_value(curpay,number_of_years_to_retirement,sal_incr)
05960 if (percentage_of_pay > max_percent_of_pay)
05970    percentage_of_pay = max_percent_of_pay
05980 endif
06000 if (entry_year>1980)
06010    num_yrs_to_ret = number_of_years_to_retirement
06020    call high_3_pay_avg(num_yrs_to_ret,curpay,sal_incr)
06030    pay_basis_for_retirement = avg_pay
06040 else
06050    pay_basis_for_retirement = projected_monthly_retirement_basepay
06060 endif
06080 projected_annual_retirement_annuity = &
06090 &  pay_basis_for_retirement * percentage_of_pay * 12 !(months)
06110 para = projected_annual_retirement_annuity
06120 rle = remain_life_expect  %adr = annual_disc_rate
06140 pv_ret_pay_at_retire = &
06150 &       fn_pv_of_retirement_benefits_at_retirement(para,rle,adr)
06170 pvrpar = pv_ret_pay_at_retire
06180 noytr = number_of_years_to_retirement
06200 pv_ret_pay_in_curr_yr = &
06210 &   fn_pv_of_retirement_benefits_in_current_year(pvrpar,noytr,adr)
06240 curr_yr_norm_cost = &
06250 & fn_current_year_individual_normal_cost(pvrpar,los,adr)
06260 call prior_year_data
06280 if (prev_yr_ind_norm_cost = 0.00) then call prior_year_normal_cost
06570 curr_yr_gain_or_loss = curr_yr_norm_cost - prev_yr_ind_norm_cost
06720   if (defer_gain_or_loss > (-999999)) and &
06730   &                                   (defer_gain_or_loss < 999999)
06740     n = number_of_years_to_retirement + 1
06750     factor = 1/((1+annual_disc_rate)**n)
```

```
06790     appld_gain_or_loss=(curr_yr_gain_or_loss+defer_gain_or_loss)&
06800     & * (annual_disc_rate/(1-factor))
06810     curr_yr_ind_ret_cost = curr_yr_norm_cost + appld_gain_or_loss
06840     target_population_retiring = number_of_new_entrants * &
06850     &            prob_of_new_entrant_retiring * tgt_grade_prob
06860     current_target_group_cost = target_population_retiring * &
06870     &                                  curr_yr_ind_ret_cost
06890   endif
06920 call display_individual_data
06930 call display_individual_retirement_cost_projections
06940 call display_target_group_retirement_cost_projections
06960 endproc  !(* individual_entry_age_normal *)
06970
07040 !*********************************************************************
07050 !*            PROCEDURE individual_subprogram_credit.                *
07060 !*********************************************************************
07070 proc individual_subprogram_credit
07080 print chr$(12) % print % print % print % print
07090 print tab(10); &
07100 & '   You are now in the individual MILRET subprogram. Detailed'
07110 print tab(10); &
07120 & 'information for an individual retirement pay grade and specific'
07130 print tab(10); &
07140 & 'year of service entry date is produced.
07150 print % print % print % print % print % print
07160 print tab(30); '                Press <enter> to continue ==>'
07170 input nothing$
07180 endproc  !(* individual_subprogram_credit *)
07190 !*********************************************************************
07200
07210 !*********************************************************************
07220 !*         PROCEDURE input_individual_data
07230 !*********************************************************************
07240 proc input_individual_data
07250   ind_data_sel$ = '0'
07260   while (ind_data_sel$ <> '8')
07270     call individual_data_display
07280     input ind_data_sel$
07290     if ind_data_sel$ = '1'
07300       print tab(5); 'Enter paygrade at retirement.'
07310       input grade$
07320       call determine_grade_factor
07325       if (g=27) then goto 7270
07330       los = avg_los_for_retired_grade(g)
07340       age = avg_age_for_retired_grade(g)
07350       tgt_grade_prob = target_retired_grade_prob(g)
07360       if (g>=1) and (g<=19)
07370         prob_of_new_entrant_retiring = enl_retire_prob
07380       elseif (g>=20) and (g<=26)
07390         prob_of_new_entrant_retiring = off_retire_prob
07400       endif
07410       call determine_life_expectancy_factor
07411       if (z=32) then goto 7270
07420       if (g>=1) and (g<=9)
07430          remain_life_expect = enl_nondis_retired_mortality(z)
07440       elseif (g>=10) and (g<=26)
07450          remain_life_expect = off_nondis_retired_mortality(z)
07460       endif
07470     elseif ind_data_sel$ = '2'
07480       print tab(5); 'Enter year of service entry.'
```

```
07490       input entry_year
07500       on conv ignore
07510       if (entry_year>=1951) and (entry_year<=1982)
07520         index = entry_year - 1950
07530         if (g>=1) and (g<=19)
07540           number_of_new_entrants = 1000 * enlisted_accession(index)
07550         elseif (g>=20) and (g<=26)
07560           number_of_new_entrants = 1000 * officer_accession(index)
07570         endif
07580       else
07590         loop
07592           print chr$(12) % print % print % print % print % print
07593           print tab(15);'   The year-of-service-entry is outside'+&
07594           &' the limits of '
07600           print tab(15);'the accession matrices (1951-1982) ' +&
07610           &'contained in the '
07611           print tab(15);'MILRET program.  Please enter the ' +&
07612           &'number of new '
07613           print tab(15);'entrants in initial year of service ' +&
07614           &'(e.g., 8500, 203000.)'
07620           input number_of_new_entrants  % on conv ignore
07630           num_new_ents = number_of_new_entrants
07640         until ((num_new_ents>0) and (num_new_ents<300000))
07650       endif
07660     elseif ind_data_sel$ = '3'
07670       print tab(5); 'Enter LOS for this paygrade'
07680       input los
07690     elseif ind_data_sel$ = '4'
07700       print tab(5); 'Enter age for this paygrade.'
07710       input age
07720     elseif ind_data_sel$ = '5'
07730       print tab(5); 'Enter remaining life expectancy'
07740       input remain_life_expect
07750     elseif ind_data_sel$ = '6'
07760       print tab(5); 'Enter probability of new entrant retiring.'
07770       input prob_of_new_entrant_retiring
07780     elseif ind_data_sel$ = '7'
07790       print tab(5); 'Enter prob. of entrant retiring in tgt. grade'
07800       input tgt_grade_prob
07810     endif
07820   endloop
07830 endproc  !(* input_individual_data *)
07840
07930 !*********************************************************************
07940 !*                 PROCEDURE_individual_data_display                 *
07950 !*********************************************************************
07960 proc individual_data_display
07970 paygrade$='              1. Paygrade at retirement = ###'
07980 entryyr$ ='              2. Year of service entry = ####'
07990 avglos$  ='              3. Average LOS for this paygrade = ##.#'
08000 avgage$  ='              4. Average age for this paygrade = ##.#'
08010 lifexpec$='              5. Remaining life expectancy = ##.##'
08020 newprob$ ='              6. Probability of new entrant ' + &
08030 &                          'retiring ='
08040 retprob$ ='              7. Probability of entrant retiring in '+&
08050 &                          'tgt grade ='
08060 ind_exit$='              8. Data entry complete'
08070 print chr$(12)
08080 print tab(25); 'Individual Subprogram Data'
08090 print tab(10); &
```

```
08100 & '   Start with item number 1 and enter the desired "Paygrade at'
08110 print tab(10); &
08120 & 'retirement." Next enter the "Year of service entry." Data items'
08130 print tab(10); &
08140 & '3 through 7 will be supplied by the program. If you desire to'
08150 print tab(10); &
08160 & 'change them, type in the appropriate number and press <enter>.'
08170 print
08180 print using paygrade$,grade$
08190 print using entryyr$,entry_year
08200 print using avglos$,los
08210 print using avgage$,age
08220 print using lifexpec$,remain_life_expect
08230 print newprob$;prob_of_new_entrant_retiring
08240 print retprob$;tgt_grade_prob
08250 print ind_exit$
08260 print
08270 print tab(40); 'Please input a number and press <enter>.'
08280 endproc  !(* individual_data_display *)
08290 !*****************************************************************
08300
08330 !*****************************************************************
08340 !*             PROCEDURE determine_grade_factor                  *
08350 !*****************************************************************
08360 proc determine_grade_factor
08370 g=27
08380 if (grade$='e1')  then g=1   %  if (grade$='e2') then g=2
08390 if (grade$='e3')  then g=3   %  if (grade$='e4') then g=4
08400 if (grade$='e5')  then g=5   %  if (grade$='e6') then g=6
08410 if (grade$='e7')  then g=7   %  if (grade$='e8') then g=8
08420 if (grade$='e9')  then g=9   %  if (grade$='w1') then g=10
08430 if (grade$='w2')  then g=11  %  if (grade$='w3') then g=12
08440 if (grade$='w4')  then g=13  %  if (grade$='o1') then g=14
08450 if (grade$='o1e') then g=15  %  if (grade$='o2') then g=16
08460 if (grade$='o2e') then g=17  %  if (grade$='o3') then g=18
08470 if (grade$='o3e') then g=19  %  if (grade$='o4') then g=20
08480 if (grade$='o5')  then g=21  %  if (grade$='o6') then g=22
08490 if (grade$='o7')  then g=23  %  if (grade$='o8') then g=24
08500 if (grade$='o9')  then g=25  %  if (grade$='o10') then g=26
08510 if not ((g>=1) and (g<=26))
08520    print chr$(12) % print % print % print
08530    print tab(19);'  You have input an invalid entry. Please ensure'
08540    print tab(18);'that the retirement grade is a lower-case letter'
08550    print tab(18);'and that the year is correct. Please press the'
08560    print tab(18);'<enter> key to continue.'
08570    input nothing$
08580 endif
08590 endproc  !(* input_paygrade_at_retirement *)
08600 !*****************************************************************
08610
08650 !*****************************************************************
08660 !*          PROCEDURE determine_life_expectancy_factor           *
08670 !*****************************************************************
08680 proc determine_life_expectancy_factor
08690 z = 32
08700 if (age<35.5) and (age>=34.5) then z=1
08710 if (age<36.5) and (age>=35.5) then z=2
08720 if (age<37.5) and (age>=36.5) then z=3
08730 if (age<38.5) and (age>=37.5) then z=4
08740 if (age<39.5) and (age>=38.5) then z=5
```

```
08750 if (age<40.5) and (age>=39.5) then z=6
08760 if (age<41.5) and (age>=40.5) then z=7
08770 if (age<42.5) and (age>=41.5) then z=8
08780 if (age<43.5) and (age>=42.5) then z=9
08790 if (age<44.5) and (age>=43.5) then z=10
08800 if (age<45.5) and (age>=44.5) then z=11
08810 if (age<46.5) and (age>=45.5) then z=12
08820 if (age<47.5) and (age>=46.5) then z=13
08830 if (age<48.5) and (age>=47.5) then z=14
08840 if (age<49.5) and (age>=48.5) then z=15
08850 if (age<50.5) and (age>=49.5) then z=16
08860 if (age<51.5) and (age>=50.5) then z=17
08870 if (age<52.5) and (age>=51.5) then z=18
08880 if (age<53.5) and (age>=52.5) then z=19
08890 if (age<54.5) and (age>=53.5) then z=20
08900 if (age<55.5) and (age>=54.5) then z=21
08910 if (age<56.5) and (age>=55.5) then z=22
08920 if (age<57.5) and (age>=56.5) then z=23
08930 if (age<58.5) and (age>=57.5) then z=24
08940 if (age<59.5) and (age>=58.5) then z=25
08950 if (age<60.5) and (age>=59.5) then z=26
08960 if (age<61.5) and (age>=60.5) then z=27
08970 if (age<62.5) and (age>=61.5) then z=28
08980 if (age<63.5) and (age>=62.5) then z=29
08990 if (age<64.5) and (age>=63.5) then z=30
09000 if (age>=64.5) then z=31
09010 endproc  !(* determine_life_expectancy_factor *)
09020 !*********************************************************************
09030
09060 !*********************************************************************
09070 !*               PROCEDURE determine_year_factor                     *
09080 !*********************************************************************
09090 proc determine_year_factor
09100 if los<22 then y=1              % if los<24 and los>=22 then y=2
09110 if los<26 and los>=24 then y=3 % if los<28 and los>=26 then y=4
09120 if los<30 and los>=28 then y=5 % if los>= 30 then y=6
09130 endproc  !(* determine_year_factor *)
09140 !*********************************************************************
09150
09200 !*********************************************************************
09210 !*                   FUNCTION  future_value                            *
09220 !*********************************************************************
09230 def fn_future_value(pv,n,i)
09240 !  pv, = current basepay at retirement paygrade
09250 !   n = number of years to retirement
09260 !   i = annual discount rate
09270    fn_future_value = pv*(1 + i)**n
09280 fnend
09290 !*********************************************************************
09300
09370 !*********************************************************************
09380 !*               PROCEDURE high_3_pay_avg                            *
09390 !*     This procedure computes the average of the last 3 years       *
09400 !*  basepay for those personnel who entered entered the service       *
09410 !*  after 1980. It assumes that the highest 3 pay years are the      *
09420 !*  last 3 years of an individuals career.                           *
09430 !*********************************************************************
09440 proc high_3_pay_avg(num_yrs,pay,ssincr)
09450    yrs = (num_yrs - 2)
09460    two_yr_prev_pay = fn_future_value(pay,yrs,ssincr)
```

```
09470    one_yr_prev_pay = two_yr_prev_pay*(1 + ssincr)
09480    retirement_yr_pay = one_yr_prev_pay*(1 + ssincr)
09490    sum_of_pays=(two_yr_prev_pay+one_yr_prev_pay+retirement_yr_pay)
09500    avg_pay = sum_of_pays/3
09510 endproc  !(* high_3_year_averaging *)
09520 !*****************************************************************
09530
09560 !*****************************************************************
09570 !*         FUNCTION pv_of_retirement_benefits_at_retirement       *
09580 !*****************************************************************
09590 def fn_pv_of_retirement_benefits_at_retirement(pmt,n,i)
09600    ! pmt = projected annual retirement pay in retirement year
09610    ! n = remaining life expectancy in years
09620    ! i = annual discount rate
09630    ! pv = "present" value of benefits in retirement year
09640    denominator = ((1+i)**n)
09650    pv = pmt * ((1-(1/denominator))/i)
09660    fn_pv_of_retirement_benefits_at_retirement = pv
09670 fnend
09680 !*****************************************************************
09690
09720 !*****************************************************************
09730 !*         FUNCTION pv_of_retire_benefits_in_current_year         *
09740 !*****************************************************************
09750 def fn_pv_of_retirement_benefits_in_current_year(fv,n,i)
09760    ! fv = "present" value of benefits in retirement year
09770    ! i = annual discount rate
09780    ! n = number of years to retirement
09790    ! pv = present value of benefits in current year
09800    pv = fv/((1+i)**n)
09810    fn_pv_of_retirement_benefits_in_current_year = pv
09820 fnend
09830 !*****************************************************************
09840
09870 !*****************************************************************
09880 !*          FUNCTION fn_current_year_individual_normal_cost      *
09890 !*****************************************************************
09900 def fn_current_year_individual_normal_cost(pv,n,i)
09910    ! pv = present value of future retirement benefits
09920    ! i = annual discount rate
09930    ! n = number of periods (length of service)
09940    ! pmt = current year normal cost payment
09950    denominator = (((1+i)**n)-1)
09960    pmt = pv * (i/denominator)
09970    fn_current_year_individual_normal_cost = pmt
09980 fnend
09990!*****************************************************************
10000
10090 !*****************************************************************
10100 !*          PROCEDURE prior_year_normal_cost                     *
10110 !*****************************************************************
10120 proc prior_year_normal_cost
10130
10150   pr_pay = prior_year_basepay(g,y)
10160   pr_yrs = (number_of_years_to_retirement + 1)
10170
10180   incr = prev_yr_salary_scale_incr
10190   prior_proj_pay = fn_future_value(pr_pay,pr_yrs,incr)
10200
10210   prior_yr = (current_year - 1)
```

```
10220   if (prior_yr > 1980)
10230     call high_3_pay_avg(pr_yrs,pr_pay,incr)
10240     prior_pay_basis = avg_pay
10250   else
10260     prior_pay_basis = prior_proj_pay
10270
10280   endif
10290
10300   pr_proj_ann_ret_pay = prior_pay_basis * percentage_of_pay * 12
10310   pp = pr_proj_ann_ret_pay
10320   le = prev_yr_remain_life_expect
10330   dr = prev_yr_annual_disc_rate
10340   prior_pv_at_ret = &
10350             & fn_pv_of_retirement_benefits_at_retirement(pp,le,dr)
10360   prev_yr_ind_norm_cost = &
10370   & fn_current_year_individual_normal_cost(prior_pv_at_ret,los,dr)
10380
10400 endproc  !(* prior_year_normal_cost *)
10410!*********************************************************************
10420
10530!*********************************************************************
10540!*             PROCEDURE display_individual_data                     *
10550!*********************************************************************
10560 proc display_individual_data
10570   print chr$(12)
10580   print tab(35); 'Individual Data Summary'
10590   print
10600   print using paygrade$,grade$
10610   print using entryyr$,entry_year
10620   print using avglos$,los
10630   print using avgage$,age
10640   print using lifexpec$,remain_life_expect
10650   print newprob$;prob_of_new_entrant_retiring
10660   print retprob$;tgt_grade_prob
10670   print tab(14);'8. Current year =';current_year
10680   print tab(14);'9. Cola =';cola
10690   print tab(13);'10. Salary scale increase =';salary_scale_incr
10700   print tab(13);'11. Annual discount rate =';annual_disc_rate
10710   print tab(13);'12. Annuity miltiplier =';annuity_multiplier
10720   print tab(13);'13. Maximum % of basepay =';max_percent_of_pay
10730   print % print
10740   print % print
10750   print tab(45); 'Press <enter> to continue ===>'
10760   input nothing$
10770 endproc  !(* display_individual_data *)
10780!*********************************************************************
10790
10810!*********************************************************************
10820!*    procedure display_individual_retirement_cost_projections       *
10830!*********************************************************************
10840 proc display_individual_retirement_cost_projections
10850 print chr$(12)
10860 print tab(20); 'Individual Retirement Cost Projections'
10870 print
10880 a$ = '    1. Current monthly basepay at retirement '
10890 b$ = 'paygrade = $######.##'
10900 print using a$ + b$; curr_pay_for_retired_grade
10910 c$ = '    2. Projected monthly basepay at retirement '
10920 d$ = 'paygrade = $######.##'
10930 print using c$ + d$; projected_monthly_retirement_basepay
```

```
10940 e$ = '    3. Pay basis for retirement = $#####.##'
10950 print using e$; pay_basis_for_retirement
10960 print '    4. Percentage multiplier = ';percentage_of_pay
10970 f$ = '    5. Projected yearly retirement annuity = $######.##'
10980 print using f$; projected_annual_retirement_annuity
10990 g$ = '    6. "Present" value of retirement benefits in '
11000 h$ = 'retirement year = $#######.##'
11010 print using g$ + h$;pv_ret_pay_at_retire
11020 i$ = '    7. Current present value of retirement '
11030 j$ = 'benefits = $#######.##'
11040 print using i$ + j$; pv_ret_pay_in_curr_yr
11050 print using &
11060 & '    8. Current year individual normal cost = $#####.##'; &
11070 & curr_yr_norm_cost
11080 print % print % print % print
11090 print tab(45); 'Press <enter> to continue ===>'
11100 input nothing$
11110 endproc  !(* display_individual_retirement_cost_projections *)
11120!*****************************************************************
11130
11140!*****************************************************************
11150!*    procedure display_target_group_retirement_cost_projections   *
11160!*****************************************************************
11170 proc display_target_group_retirement_cost_projections
11180   print chr$(12)
11190   print tab(20); 'Target Group Retirement Cost Projections'
11200   print
11210   k$ = '    1. Current year individual normal cost ..........'+&
11220   & '$    @Z,ZZZ,ZZZV.##@'
11230   print using k$;curr_yr_norm_cost
11240   l$ = '    2. Previous year individual normal cost ..........'+&
11250   & '$    @Z,ZZZ,ZZZV.##@'
11260   print using l$;prev_yr_ind_norm_cost
11270   m$ = '    3. Current year gains or losses .................'+&
11280   & '$      @ZZZ,ZZZV.##@'
11290   print using m$;curr_yr_gain_or_loss
11300   n$ = '    4. Deferred gains or losses .....................'+&
11310   & '$      @ZZZ,ZZZV.##@'
11320   print using n$;defer_gain_or_loss
11330   o$ = '    5. Applied gain or loss .........................'+&
11340   & '$    @Z,ZZZ,ZZZV.##@'
11350   print using o$; appld_gain_or_loss
11360   p$ = '    6. Current year individual retirement cost ......'+&
11370   & '$   @ZZ,ZZZ,ZZZV.##@'
11380   print using p$;curr_yr_ind_ret_cost
11390   q$ = '    7. Number of new entrants in entry year .........'+&
11400   & '          @ZZZ,ZZZ@'
11410   print using q$;number_of_new_entrants
11420   r$ = '    8. Target population retiring ...................'+&
11430   & '           @ZZ,ZZZ@'
11440   print using r$;target_population_retiring
11450   s$ = '    9. Current target group retirement cost .........'+&
11460   & '$@Z,ZZZ,ZZZ,ZZZV.##@'
11470   print using s$;current_target_group_cost
11480   print % print % print % print
11490   print tab(45); 'Press <enter> to continue ==>'
11500   input nothing$
11510 endproc  !(* display_target_group_retirement_cost_projections *)
11520!*****************************************************************
11525
```

```
11530!*********************************************************************
11540!*              PROCEDURE prior_year_data                            *
11550!*********************************************************************
11620 proc prior_year_data
11630 prev_yr_ind_norm_cost = 0.00  %  defer_gain_or_loss = 0.00
11650 prev_yr_annual_disc_rate = annual_disc_rate
11660 prev_yr_salary_scale_incr = salary_scale_incr
11670 prev_yr_remain_life_expect = remain_life_expect
11690 on conv ignore
11700 data_sel$ = '0'
11710 while (data_sel$<>'6')
11720    call print_prior_menu
11730    input data_sel$
11740    if data_sel$='1'
11750       print tab(05); &
11760       &'Enter previous year individual normal cost (e.g., 5823.6).'
11770       input prev_yr_ind_norm_cost
11780    elseif data_sel$='2'
11800       print tab(05); &
11810       & 'Enter any deferred gains or losses (e.g., 127.24).'
11820       input defer_gain_or_loss
11830    elseif data_sel$='3'
11850       print tab(05); &
11860       & 'Enter previous year salary scale increase (e.g., .045).'
11870       input prev_yr_salary_scale_incr
11880    elseif data_sel$='4'
11900       print tab(05); &
11910       & 'Enter previous year annual discount rate (e.g., .072).'
11920       input prev_yr_annual_disc_rate
11930    elseif data_sel$='5'
11950       print tab(05); &
11960       & 'Enter previous year life expectancy (e.g., 31.25).'
11970       input prev_yr_remain_life_expect
11980    endif
11990 endloop
12000 endproc !(* prior_year_stuff *)
12020 proc print_prior_menu
12030 pyinc$ = '          1. Previous year individual normal'+&
12040 & ' cost = $#####.##'
12050 dgol$  = '          2. Deferred gains or losses = $#####.##'
12060 pyssi$ = '          3. Previous year salary scale increase = .###'
12070 pyadr$ = '          4. Previous year annual discount rate = .###'
12080 pyle$  = '          5. Previous year life expectancy = ##.##'
12090 exit$  = '          6. No changes or changes are complete'
12100 print chr$(12)
12110 print tab(25); 'Previous Year Normal Cost Data'
12120 print
12130 print tab(10); &
12140 & '   The previous year individual normal cost will be calculated'
12150 print tab(10); &
12160 & 'based on the current year actuarial assumptions and other data'
12170 print tab(10); &
12180 & 'displayed below.  However, different values may be entered by'
12190 print tab(10); &
12200 & 'selecting the appropriate number, pressing <enter>,  and then'
12210 print tab(10); &
12220 & 'entering your data.  Enter any known deferred gains/losses.'
12230 print tab(10); &
12260 & 'If you enter a value for previous year, it will be used instead'
12262 print tab(10); &
```

```
12264 & 'of one being computed by the program.'
12270 print
12280 print using pyinc$,prev_yr_ind_norm_cost
12290 print using dgol$,defer_gain_or_loss
12300 print using pyssi$,prev_yr_salary_scale_incr
12310 print using pyadr$,prev_yr_annual_disc_rate
12320 print using pyle$,prev_yr_remain_life_expect
12330 print exit$
43910 print
43920 print tab(40); 'Please input a number and press <enter>.
43930 endproc !(* print_prior_menu *)
43950!*********************************************************************
43960
50000!*********************************************************************
50010!*               PROCEDURE aggregate_entry_age_normal                *
50020!*********************************************************************
50030 proc aggregate_entry_age_normal
50040 call aggregate_curr_data_entry
50050 call aggregate_prev_and_total_data_entry
50060 endproc !(* aggregate_entry_age_normal *)
50065
50070!*********************************************************************
50080!*            PROCEDURE aggregate_curr_data_entry                    *
50090!*********************************************************************
50100 proc aggregate_curr_data_entry
50110 annual_disc_rate = .060
50120 defer_gain_or_loss = 0.00
50140 on conv ignore  %  on ioerr ignore
50150 data_sel$ = '0'
50160 while (data_sel$<>'6')
50170    call print_curr_agg_menu
50180    input data_sel$
50190    if data_sel$='1'
50200       print tab(05); 'Enter present value of future benefits.'
50210       input pres_val_of_fut_ben
50220       norm_cost_per_fac = pres_val_of_fut_ben/pres_val_of_fut_comp
50240    elseif data_sel$='2'
50250       print tab(05); 'Enter present value of future compensation.'
50260       input pres_val_of_fut_comp
50270       norm_cost_per_fac = pres_val_of_fut_ben/pres_val_of_fut_comp
50280    elseif data_sel$='3'
50300       print tab(05); 'Enter new normal cost % factor (e.g., .526).'
50310       input new_norm_cost_per_fac
50320       norm_cost_per_fac = new_norm_cost_per_fac
50330    elseif data_sel$='4'
50350       print tab(05); 'Enter current FY total base pay.'
50360       input cur_fy_tot_bp
50370    endif
50380 endloop
50390 endproc !(* aggregate_curr_data_entry *)
50400!*********************************************************************
50410
50420!*********************************************************************
50430!*                  PROCEDURE print_curr_agg_menu                    *
50440!*********************************************************************
50450 proc print_curr_agg_menu
50460 cur_fy_norm_cost = norm_cost_per_fac * &
50470 &          cur_fy_tot_bp
50480 pvofb$ = '     1. Present value of future benefits .......'+&
50490 &'..... $ZZZZ,ZZZ,ZZZ,ZZZV.##'
```

```
50500 pvofc$ = '     2. Present value of future compensation ...'+&
50510 &'..... $@ZZZ,ZZZ,ZZZ,ZZZV.##@'
50520 ncpf$  = '     3. Normal cost percentage factor ..........'+&
50530 &'.....              @V.ZZZZ@'
50540 cfytp$ = '     4. Current FY total base pay ..............'+&
50550 &'..... $@ZZZ,ZZZ,ZZZ,ZZZV.##@'
50560 cfync$ = '     5. Current FY active force normal cost ....'+&
50570 &'..... $@ZZZ,ZZZ,ZZZ,ZZZV.##@'
50580 exit$  = '     6. No changes or changes are complete'
50590 print chr$(12)
50600 print tab(25); 'Aggregate Current FY Data'
50610 print
50620 print tab(10); &
50630 & '   Enter the present value of future benefits, the present '
50640 print tab(10); &
50650 & 'value of future compensation, and the current FY total base'
50660 print tab(10); &
50670 & 'pay.  The normal cost percentage factor and the current FY '
50680 print tab(10); &
50690 & 'active force normal cost will be computed.  If you desire to '
50700 print tab(10); &
50710 & 'change the normal cost percentage factor, do so and a new '
50720 print tab(10); &
50730 & 'active force normal cost will be computed.'
50740 print
50750 print using pvofb$,pres_val_of_fut_ben
50760 print using pvofc$,pres_val_of_fut_comp
50770 print using ncpf$,norm_cost_per_fac
50780 print using cfytp$,cur_fy_tot_bp
50790 print using cfync$,cur_fy_norm_cost
50800 print exit$
50810 print
50820 print tab(40); 'Please input a number and press <enter>.
50830 endproc !(* print_curr_agg_menu *)
50840!*********************************************************************
50850
50860!*********************************************************************
50870!*        PROCEDURE aggregate_prev_and_total_data_entry              *
50880!*********************************************************************
50890 proc aggregate_prev_and_total_data_entry
50910 on conv ignore  %  on ioerr ignore
50920 data_sel$ = '0'
50930 while (data_sel$<>'8')
50940    call print_prev_and_total_agg_menu
50950    input data_sel$
50960    if data_sel$='1'
50970       print tab(05); 'Enter previous FY normal cost percentage.'
50980       input prev_fy_norm_cost_per
50990       prev_fy_norm_cost = prev_fy_norm_cost_per * prev_fy_tot_bp
51000       cur_fy_gain_loss = (cur_fy_norm_cost - prev_fy_norm_cost)
51020    elseif data_sel$='2'
51030       print tab(05); 'Enter previous FY total base pay.'
51040       input prev_fy_tot_bp
51050       prev_fy_norm_cost = prev_fy_norm_cost_per * prev_fy_tot_bp
51060       cur_fy_gain_loss = (cur_fy_norm_cost - prev_fy_norm_cost)
51080    elseif data_sel$='3'
51090       print tab(05); 'Enter previous FY active force normal cost.'
51100       input new_prev_fy_norm_cost
51110       prev_fy_norm_cost = new_prev_fy_norm_cost
51120       cur_fy_gain_loss = (cur_fy_norm_cost - prev_fy_norm_cost)
```

```
51140    elseif data_sel$='4'
51150       print tab(05); 'Enter current FY actuarial gains/losses.'
51160       input new_cur_fy_gain_loss
51170       cur_fy_gain_loss = new_cur_fy_gain_loss
51190    elseif data_sel$='5'
51200       print tab(05); 'Enter any deferred gains or losses.'
51210       input def_gain_loss
51220    endif
51230 endloop
51240 endproc
51250!*****************************************************************
51260
51270!*****************************************************************
51280!*         PROCEDURE print_prev_and_total_agg_menu                *
51290!*****************************************************************
51300 proc print_prev_and_total_agg_menu
51320 cur_fy_gain_loss = cur_fy_norm_cost - prev_fy_norm_cost
51330 cur_fy_gain_loss_appld = (cur_fy_gain_loss + def_gain_loss) * &
51340 & (annual_disc_rate/(1-(1/((1+annual_disc_rate)**20))))
51350 cur_fy_tot_ret_cost = cur_fy_norm_cost + cur_fy_gain_loss_appld
51360 pyncp$ = '     1. Previous FY normal cost percentage .....'+&
51370 &'.....              @V.ZZZZ@'
51380 pytbp$ = '     2. Previous FY total base pay ............'+&
51390 &'..... $@ZZZ,ZZZ,ZZZ,ZZZV.##@'
51400 pyfnc$ = '     3. Previous FY active force normal cost ...'+&
51410 &'..... $@ZZZ,ZZZ,ZZZ,ZZZV.##@'
51420 cyagl$ = '     4. Current FY actuarial gains/losses ......'+&
51430 &'..... $@ZZZ,ZZZ,ZZZ,ZZZV.##@'
51440 defgl$ = '     5. Deferred gains or losses ..............'+&
51450 &'..... $@ZZZ,ZZZ,ZZZ,ZZZV.##@'
51460 cygla$ = '     6. Current FY gains/losses applied ........'+&
51470 &'..... $@ZZZ,ZZZ,ZZZ,ZZZV.##@'
51480 cytrc$ = '     7. Current FY total retirement cost .......'+&
51490 &'..... $@ZZZ,ZZZ,ZZZ,ZZZV.##@'
51500 exit$  = '     8. No changes or changes are complete'
51510 print chr$(12)
51520 print tab(16); 'Aggregate Previous FY and Current FY Total Data'
51530 print
51540 print tab(10); &
51550 & '   Enter the previous FY normal cost percentage, the previous'
51560 print tab(10); &
51570 & 'FY active force normal cost, and any deferred gains or losses'
51580 print tab(10); &
51590 & 'to compute the previous FY active force normal cost, current'
51600 print tab(10); &
51610 & 'gains/losses applied, and the current FY total retirement cost.'
51620 print
51630 print using pyncp$,prev_fy_norm_cost_per
51640 print using pytbp$,prev_fy_tot_bp
51650 print using pyfnc$,prev_fy_norm_cost
51660 print using cyagl$,cur_fy_gain_loss
51670 print using defgl$,def_gain_loss
51680 print using cygla$,cur_fy_gain_loss_appld
51690 print using cytrc$,cur_fy_tot_ret_cost
51700 print exit$
51710 print
51720 print tab(40); 'Please input a number and press <enter>.
51730 endproc !(* print_prev_and_total_agg_menu *)
51735!*****************************************************************
51740
```

```
60000 !*****************************************************************
60010 !*      PROCEDURE expanded_multi_year_individual_normal          *
60020 !*****************************************************************
60030 proc expanded_multi_year_individual_normal
60040 print chr$(12) % print % print % print
60050 print tab(10); &
60060 & '   You are now in the multiyear expanded individual normal cost'
60070 print tab(10); &
60080 & 'portion of the program.  Note that in this section an answer of'
60090 print tab(10); &
60100 & '0 (zero) to an adjustment question means no change.'
60110 print % print
60120 Print 'Input desired discount rate as decimal (e.g. .08).
60130 input di
60140 print 'Input desired rate of salary increase as decimal (e.g. .055).
60150 input in
60160 print 'Input desired % rate of retired pay per year of duty (e.g. .02!
60170 input dl
60180 print 'Input desired maximum % of pay basis at retirement (e.g. .75).
60190 input dm
60200 print 'Input minimum los required to retire (e.g. 20).
60210 input mrt
60220 print 'Input adjustment to entrant retirement probability for officer:
60230 print '(e.g. -.02). The baseline value is 0.4.
60240 input pror
60250 print 'Input adjustment to entrant retirement probability for'
60260 print 'enlisted personnel.
60270 print '(e.g. -.02). The baseline value is 0.12.
60280 input proq
60290 print 'Input adjustment to LOS and age at retirement (e.g. -2).
60300 input adj
60310 print 'Input adjustment to life expectancy at retirement (e.g. +3).
60320 input long
60330 print'If you wish to see only summary totals, type sum.'
60340 print 'If you wish to see full detail, type detail.'
60350 input c$
60360 delt=1
60370 g=99
60380 tttrc=0
60390 ys=1953
60400 pg$='e1'
60410 print'*****************************************************************'
60420 ttrc=0
60430 if (pg$='e1') then g=1
60440 if (pg$='e2') then g=2
60450 if (pg$='e3') then g=3
60460 if (pg$='e4') then g=4
60470 if (pg$='e5') then g=5
60480 if (pg$='e6') then g=6
60490 if (pg$='e7') then g=7
60500 if (pg$='e8') then g=8
60510 if (pg$='e9') then g=9
60520 if (pg$='w1') then g=10
60530 if (pg$='w2') then g=11
60540 if (pg$='w3') then g=12
60550 if (pg$='w4') then g=13
60560 if (pg$='o1') then g=14
60570 if (pg$='o1e') then g=15
60580 if (pg$='o2') then g=16
60590 if (pg$='o2e') then g=17
```

```
60600 if (pg$='o3') then g=18
60610 if (pg$='o3e') then g=19
60620 if (pg$='o4') then g=20
60630 if (pg$='o5') then g=21
60640 if (pg$='o6') then g=22
60650 if (pg$='o7') then g=23
60660 if (pg$='o8') then g=24
60670 if (pg$='o9') then g=25
60680 if (pg$='o10') then g=26
60690 if (g=99) then goto 60370
60700 los=avg_los_for_retired_grade(g)+adj
60710 if (los <mrt) then los=mrt
60720 if (los<22) and (los>=20) then l=1
60730 if (los<24) and (los>=22) then l=2
60740 if (los<26) and (los>=24) then l=3
60750 if (los<28) and (los>=26) then l=4
60760 if (los<30) and (los>=28) then l=5
60770 if (los>=30) then l=6
60780 bp=current_year_basepay(g,l)
60790 cf=1983
60800 rf=los+ys
60810 n=rf-cf
60820 pp=bp
60830 for i=1 to n
60840 tp=pp*in
60850 pp=tp+pp
60860 next i
60870 fac =los * dl
60880 if (fac>dm) then fac=dm
60890 if (ys>1980) then goto 61650
60900 ann=fac*pp*12
60910 if (pg$='e1') then goto 61500
60920 if (n<0) then goto 61820
60930 if (d(g)+adj<mrt) and (mrt>20) then goto 61780
60940 ag=f(g)+adj
60950 if (ag<17+mrt) then ag=17+mrt
60960 if (ag<37) and (ag>=36) then z=1
60970 if (ag<38) and (ag>=37) then z=2
60980 if (ag<39) and (ag>=38) then z=3
60990 if (ag<40) and (ag>=39) then z=4
61000 if (ag<41) and (ag>=40) then z=5
61010 if (ag<42) and (ag>=41) then z=6
61020 if (ag<43) and (ag>=42) then z=7
61030 if (ag<44) and (ag>=43) then z=8
61040 if (ag<45) and (ag>=44) then z=9
61050 if (ag<46) and (ag>=45) then z=10
61060 if (ag<47) and (ag>=46) then z=11
61070 if (ag<48) and (ag>=47) then z=12
61080 if (ag<49) and (ag>=48) then z=13
61090 if (ag<50) and (ag>=49) then z=14
61100 if (ag<51) and (ag>=50) then z=15
61110 if (ag<52) and (ag>=51) then z=16
61120 if (ag<53) and (ag>=52) then z=17
61130 if (ag<54) and (ag>=53) then z=18
61140 if (ag<55) and (ag>=54) then z=19
61150 if (ag<56) and (ag>=55) then z=20
61160 if (ag<57) and (ag>=56) then z=21
61170 if (ag<58) and (ag>=57) then z=22
61180 if (ag<59) and (ag>=58) then z=23
61190 if (ag<60) and (ag>=59) then z=24
```

```
61200 if (ag<61) and (ag>=60) then z=25
61210 if (ag<62) and (ag>=61) then z=27
61220 if (ag<63) and (ag>=62) then z=28
61230 if (ag<64) and (ag>=63) then z=29
61240 if (ag<65) and (ag>=64) then z=30
61250 if (ag>=65) then z=31
61260 if (g<=9) then li=e(z)
61270 if (g>=10) then li=oz(z)
61280 li=li+long
61290 q=(1+di)**li
61300 pre=ann*((1-(1/q))/di)
61310 t=((1+di)**los)-1
61320 nc=pre*(di/t)
61330 rc=nc
61340 if (g>=20) then goto 61380
61350 if (g<20) then pro=.12
61360 if (g<20) then prop=proq
61370 goto 61400
61380 if (g>=20) then pro=.4
61390 if (g>=20) then prop=pror
61400 pro=(pro+prop)*delt
61410 delt=1
61420 tgt=target_retired_grade_prob(g)
61430 if (ys>1950) and (ys<1983) then goto 61750
61440 pec=pro*tgt*new
61450 trc=pec*rc
61460 ttrc=ttrc+trc
61470 if (c$='sum') then goto 61490
61480 print using '##############',pg$;nc;trc
61490 goto 61850
61500 print 'Year of Entry = ';ys
61510 if (c$='sum') then goto 61640
61520 print 'DISCOUNT RATE =';di
61530 print 'SALARY SCALE ESTIMATOR = ';in
61540 print 'ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY FOR'
61550 print 'OFFICERS = ';pror
61560 print 'ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY FOR'
61570 print 'ENLISTED PERSONNEL = ';proq
61580 print 'ADJUSTMENT TO LOS AND AGE AT RETIREMENT = ';adj
61590 print 'ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = ';long
61600 print 'RETIREMENT PAY BASIS PER YEAR OF SERVICE = ';dl
61610 print 'RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = ';dm
61620 print 'MINIMUM LOS FOR RETIREMENT = ';mrt
61630 print 'PAYGRADE    NORMAL COST    TOTAL COST'
61640 goto 60920
61650 a=n-2
61660 rp=bp
61670 for k=1 to a
61680 vp=rp*in
61690 rp=vp+rp
61710 next k
61720 sp=(in*rp)+rp
61730 pp=(sp+rp+pp)/3
61740 goto 60900
61750 if (g>=20) then new=1000*officer_accession(ys-1950)
61760 if (g<20) then new=1000*enlisted_accession(YS-1950)
61770 goto 61440
61775 average_los=avg_los_for_retired_grade(g)
61780 ag=avg_age_for_retired_grade(g)+mrt-average_los-adj
61790 REM FORMULA TO AJD ATTRITON IF AVG LOS < MLOS FOR RETIREMENT
```

```
61800 delt=1.00**(mrt-average_los-adj)
61810 goto 60950
61820 nc=0
61830 trc=0
61840 goto 61460
61850 IF (pg$='o10') THEN GOTO 62100
61860 IF (pg$='o9') THEN PG$='O10'
61870 IF (pg$='o8') THEN PG$='O9'
61880 IF (pg$='o7') THEN PG$='O8'
61890 IF (pg$='o6') THEN PG$='O7'
61900 IF (pg$='o5') THEN PG$='O6'
61910 IF (pg$='o4') THEN PG$='O5'
61920 IF (pg$='o3e') THEN PG$='O4'
61930 IF (pg$='o2e') THEN PG$='O3E'
61940 IF (PG$='O1E') THEN PG$='O2E'
61950 IF (PG$='W4') THEN PG$='O1E'
61960 IF (PG$='W3') THEN PG$='W4'
61980 IF (PG$='W2') THEN PG$='W3'
61990 IF (PG$='W1') THEN PG$='W2'
62000 IF (PG$='E9') THEN PG$='W1'
62010 IF (PG$='E8') THEN PG$='E9'
62020 IF (PG$='E7') THEN PG$='E8'
62030 IF (PG$='E6') THEN PG$='E7'
62040 IF (PG$='E5') THEN PG$='E6'
62050 IF (PG$='E4') THEN PG$='E5'
62060 IF (PG$='E3') THEN PG$='E4'
62070 IF (PG$='E2') THEN PG$='E3'
62080 IF (PG$='E1') THEN PG$='E2'
62090 GOTO 60430
62100 PRINT USING 'TOTAL YEAR GROUP COST =  $############';TTRC
62110 TTTRC=TTTRC+TTRC
62120 IF YS=1982 THEN GOTO 62150
62130 YS=YS+1
62140 goto 60400
62150 print'*************************************************************'
62160 print using 'Regular Navy Cost = $######################';tttrc
62170 print'*************************************************************'
62190 endproc  !(* expanded_multi_year_individual *)
```

APPENDIX B

MILRET COMPUTER PRINTOUTS

```
                    MILITARY PENSION COSTS

        This is a three-part interactive program that
      calculates individual, aggregate, and multi-year
      retirement costs.  Choose a selection from the
      following list of options:

        1. Program description

        2. Enter/change data and actuarial assumptions

        3. Individual entry-age cost method

        4. Aggregate entry-age cost method

        5. Expanded multi-year individual cost method

        6. Exit program

 Type in your selection number and press the <enter> key.
1

                        MILRET Description

        Welcome to the MILRET program.  This program was developed
      at the Naval Postgraduate School in 1983 and revised in 1985.
      The program utilizes three variations of the entry-age normal
      method of determining retirement costs:

                1. Individual entry age normal
                2. Aggregate entry age normal
                3. Multi-year expanded individual

        The individual subprogram produces detailed information at
      the individual paygrade and year of service entry level.
      Retirement costs are computed from user-supplied information
      and internally stored data. Some of the actuarial and economic
      assumptions may be changed by the operator.


                              Please press <enter> to continue ==>
?
```

MILRET Description (cont.)

The aggregate subprogram requires the operator to input all of the data. The information stored within the program is not available to this subprogram. There are no "hardwired" probability assumptions.

The multi-year expanded individual subprogram computes both normal costs and total retirement costs for years 1953 through 1982. This subprogram utilizes user-provided data and stored information. The operator may select from a "summary" or a "detail" presentation of the retirement cost calculations.

When you are returned to the main menu, please select from the options listed. If this is your first time with this program, you may want to review the assumptions first.

Please press <enter> to return to main menu.

?

Military Pension Costs

This is a three-part interactive program that calculates individual, aggregate, and multi-year retirement costs. Choose a selection from the following list of options:

1. Program description
2. Enter/change data and actuarial assumptions
3. Individual entry-age cost method
4. Aggregate entry-age cost method
5. Expanded multi-year individual cost method
6. Exit program

Type in your selection number and press the <enter> key.

2

MILRET Data

The following actuarial and economic values are currently stored within the MILRET program. To change a value, type in the selection number first (i.e., from 1 to 7) and press <enter>. When the prompt appears, type in the new value as a decimal (e.g., .065) and press <enter> again. Repeat this as often as necessary. Enter an "8" to return to the main menu.

1. COLA = .050
2. Salary scale increase = .055
3. Annual discount rate = .060
4. Annuity multiplier = .025
5. Maximum percentage of base pay = .750
6. Officer retirement probability = .400
7. Enlisted retirement probability = .120
8. No changes or changes are complete

Please input a number and press <enter>.

8

```
                    Military Pension Costs

          This is a three-part interactive program that
        calculates individual, aggregate, and multi-year
        retirement costs.  Choose a selection from the
        following list of options:

          1. Program description

          2. Enter/change data and actuarial assumptions

          3. Individual entry-age cost method

          4. Aggregate entry-age cost method

          5. Expanded multi-year individual cost method

          6. Exit program

 Type in your selection number and press the <enter> key.
3



          You are now in the individual MILRET subprogram. Detailed
        information for an individual retirement pay grade and specific
        year of service entry date is produced.



                                          Press <enter> to continue ==>
?

                    Individual Subprogram Data
          Start with item number 1 and enter the desired "Paygrade at
        retirement." Next enter the "Year of service entry." Data items
        3 through 7 will be supplied by the program. If you desire to
        change them, type in the appropriate number and press <enter>.

            1. Paygrade at retirement =
            2. Year of service entry =  0
            3. Average LOS for this paygrade =  0.0
            4. Average age for this paygrade =  0.0
            5. Remaining life expectancy =  0.00
            6. Probability of new entrant retiring = 0
            7. Probability of entrant retiring in tgt grade = 0
            8. Data entry complete

                                     Please input a number and press <enter>.
1
    Enter paygrade at retirement.
o5
```

```
                    Individual Subprogram Data
      Start with item number 1 and enter the desired "Paygrade at
    retirement." Next enter the "Year of service entry." Data items
    3 through 7 will be supplied by the program. If you desire to
    change them, type in the appropriate number and press <enter>.

        1. Paygrade at retirement = o5
        2. Year of service entry =  0
        3. Average LOS for this paygrade = 24.9
        4. Average age for this paygrade = 46.3
        5. Remaining life expectancy = 30.83
        6. Probability of new entrant retiring = .4
        7. Probability of entrant retiring in tgt grade = .3299
        8. Data entry complete

                                    Please input a number and press <enter>.
2
   Enter year of service entry.
1973

                    Individual Subprogram Data
      Start with item number 1 and enter the desired "Paygrade at
    retirement." Next enter the "Year of service entry." Data items
    3 through 7 will be supplied by the program. If you desire to
    change them, type in the appropriate number and press <enter>.

        1. Paygrade at retirement = o5
        2. Year of service entry = 1973
        3. Average LOS for this paygrade = 24.9
        4. Average age for this paygrade = 46.3
        5. Remaining life expectancy = 30.83
        6. Probability of new entrant retiring = .4
        7. Probability of entrant retiring in tgt grade = .3299
        8. Data entry complete

                                    Please input a number and press <enter>.
8

                    Previous Year Normal Cost Data

      The previous year individual normal cost will be calculated
    based on the current year actuarial assumptions and other data
    displayed below.  However, different values may be entered by
    selecting the appropriate number, pressing <enter>,  and then
    entering your data.  Enter any known deferred gains/losses.
    If you enter a value for previous year, it will be used instead
    of one being computed by the program.

        1. Previous year individual normal cost = $    0.00
        2. Deferred gains or losses = $    0.00
        3. Previous year salary scale increase = .055
        4. Previous year annual discount rate = .060
        5. Previous year life expectancy = 30.83
        6. No changes or changes are complete

                                    Please input a number and press <enter>.
1
   Enter previous year individual normal cost (e.g., 5823.6).
12345.66
```

```
                    Previous Year Normal Cost Data

      The previous year individual normal cost will be calculated
    based on the current year actuarial assumptions and other data
    displayed below.  However, different values may be entered by
    selecting the appropriate number, pressing <enter>,  and then
    entering your data.  Enter any known deferred gains/losses.
    If you enter a value for previous year, it will be used instead
    of one being computed by the program.

      1. Previous year individual normal cost = $12345.66
      2. Deferred gains or losses = $    0.00
      3. Previous year salary scale increase = .055
      4. Previous year annual discount rate = .060
      5. Previous year life expectancy = 30.83
      6. No changes or changes are complete

                                  Please input a number and press <enter>.
2
    Enter any deferred gains or losses (e.g., 127.24).
327.58

                    Previous Year Normal Cost Data

      The previous year individual normal cost will be calculated
    based on the current year actuarial assumptions and other data
    displayed below.  However, different values may be entered by
    selecting the appropriate number, pressing <enter>,  and then
    entering your data.  Enter any known deferred gains/losses.
    If you enter a value for previous year, it will be used instead
    of one being computed by the program.

      1. Previous year individual normal cost = $12345.66
      2. Deferred gains or losses = $  327.58
      3. Previous year salary scale increase = .055
      4. Previous year annual discount rate = .060
      5. Previous year life expectancy = 30.83
      6. No changes or changes are complete

                                  Please input a number and press <enter>.
6

                        Individual Data Summary

      1. Paygrade at retirement = o5
      2. Year of service entry = 1973
      3. Average LOS for this paygrade = 24.9
      4. Average age for this paygrade = 46.3
      5. Remaining life expectancy = 30.83
      6. Probability of new entrant retiring = .4
      7. Probability of entrant retiring in tgt grade = .3299
      8. Current year = 1983
      9. Cola = .05
     10. Salary scale increase = .055
     11. Annual discount rate = .06
     12. Annuity miltiplier = .025
     13. Maximum % of basepay = .75


                                  Press <enter> to continue ===>
?
```

```
                    Individual Retirement Cost Projections

     1. Current monthly basepay at retirement paygrade = $ 3266.10
     2. Projected monthly basepay at retirement paygrade = $ 7252.56
     3. Pay basis for retirement = $ 7252.56
     4. Percentage multiplier =  .6225
     5. Projected yearly retirement annuity = $ 54176.60
     6. "Present" value of retirement benefits in retirement year = $ 753154.04
     7. Current present value of retirement benefits = $ 316101.40
     8. Current year individual normal cost = $13832.30



                                        Press <enter> to continue ===>
?

                    Target Group Retirement Cost Projections

     1. Current year individual normal cost .....$       13,832.30
     2. Previous year individual normal cost .....$      12,345.66
     3. Current year gains or losses .............$       1,486.64
     4. Deferred gains or losses .................$         327.58
     5. Applied gain or loss .....................$         180.21
     6. Current year individual retirement cost ..$      14,012.51
     7. Number of new entrants in entry year .....            7,600
     8. Target population retiring ...............            1,003
     9. Current target group retirement cost .....$  14,053,089.97



                                        Press <enter> to continue ==>
?

                         Military Pension Costs

          This is a three-part interactive program that
        calculates individual, aggregate, and multi-year
        retirement costs.  Choose a selection from the
        following list of options:

          1. Program description

          2. Enter/change data and actuarial assumptions

          3. Individual entry-age cost method

          4. Aggregate entry-age cost method

          5. Expanded multi-year individual cost method

          6. Exit program

 Type in your selection number and press the <enter> key.
4
```

```
                    Aggregate Current FY Data

          Enter the present value of future benefits, the present
        value of future compensation, and the current FY total base
        pay.  The normal cost percentage factor and the current FY
        active force normal cost will be computed.  If you desire to
        change the normal cost percentage factor, do so and a new
        active force normal cost will be computed.

     1. Present value of future benefits ..... $              .00
     2. Present value of future compensation ..... $          .00
     3. Normal cost percentage factor ..............        .0000
     4. Current FY total base pay ................. $          .00
     5. Current FY active force normal cost ..... $          .00
     6. No changes or changes are complete

                                  Please input a number and press <enter>.
1
   Enter present value of future benefits.
2456784256.67
KO-17 Divide by zero

                    Aggregate Current FY Data

          Enter the present value of future benefits, the present
        value of future compensation, and the current FY total base
        pay.  The normal cost percentage factor and the current FY
        active force normal cost will be computed.  If you desire to
        change the normal cost percentage factor, do so and a new
        active force normal cost will be computed.

     1. Present value of future benefits ..... $  2,456,784,256.67
     2. Present value of future compensation ..... $          .00
     3. Normal cost percentage factor ..............        .****
     4. Current FY total base pay ................. $          .00
     5. Current FY active force normal cost ..... $          .00
     6. No changes or changes are complete

                                  Please input a number and press <enter>.
2
   Enter present value of future compensation.
3487458998.56

                    Aggregate Current FY Data

          Enter the present value of future benefits, the present
        value of future compensation, and the current FY total base
        pay.  The normal cost percentage factor and the current FY
        active force normal cost will be computed.  If you desire to
        change the normal cost percentage factor, do so and a new
        active force normal cost will be computed.

     1. Present value of future benefits ..... $  2,456,784,256.67
     2. Present value of future compensation ..... $  3,487,458,998.56
     3. Normal cost percentage factor ..............        .7045
     4. Current FY total base pay ................. $          .00
     5. Current FY active force normal cost ..... $          .00
     6. No changes or changes are complete

                                  Please input a number and press <enter>.
4
   Enter current FY total base pay.
4467832456.99
```

```
                    Aggregate Current FY Data

          Enter the present value of future benefits, the present
        value of future compensation, and the current FY total base
        pay.  The normal cost percentage factor and the current FY
        active force normal cost will be computed.  If you desire to
        change the normal cost percentage factor, do so and a new
        active force normal cost will be computed.

     1. Present value of future benefits ..... $  2,456,784,256.67
     2. Present value of future compensation ..... $  3,487,458,998.56
     3. Normal cost percentage factor .....                    .7045
     4. Current FY total base pay ..... $  4,467,832,456.99
     5. Current FY active force normal cost ..... $  3,147,420,642.45
     6. No changes or changes are complete

                                        Please input a number and press <enter>.
6

            Aggregate Previous FY and Current FY Total Data

          Enter the previous FY normal cost percentage, the previous
        FY active force normal cost, and any deferred gains or losses
        to compute the previous FY active force normal cost, current
        gains/losses applied, and the current FY total retirement cost.

     1. Previous FY normal cost percentage .....                .0000
     2. Previous FY total base pay ..... $                       .00
     3. Previous FY active force normal cost ..... $             .00
     4. Current FY actuarial gains/losses ..... $  3,147,420,642.45
     5. Deferred gains or losses ..... $                         .00
     6. Current FY gains/losses applied ..... $    274,406,474.33
     7. Current FY total retirement cost ..... $  3,421,827,116.78
     8. No changes or changes are complete

                                        Please input a number and press <enter>.
1
    Enter previous FY normal cost percentage.
.57

            Aggregate Previous FY and Current FY Total Data

          Enter the previous FY normal cost percentage, the previous
        FY active force normal cost, and any deferred gains or losses
        to compute the previous FY active force normal cost, current
        gains/losses applied, and the current FY total retirement cost.

     1. Previous FY normal cost percentage .....                .5700
     2. Previous FY total base pay ..... $                       .00
     3. Previous FY active force normal cost ..... $             .00
     4. Current FY actuarial gains/losses ..... $  3,147,420,642.45
     5. Deferred gains or losses ..... $                         .00
     6. Current FY gains/losses applied ..... $    274,406,474.33
     7. Current FY total retirement cost ..... $  3,421,827,116.78
     8. No changes or changes are complete

                                        Please input a number and press <enter>.
2
    Enter previous FY total base pay.
3784592034.57
```

```
                Aggregate Previous FY and Current FY Total Data

           Enter the previous FY normal cost percentage, the previous
         FY active force normal cost, and any deferred gains or losses
         to compute the previous FY active force normal cost, current
         gains/losses applied, and the current FY total retirement cost.

      1. Previous FY normal cost percentage .....                .5700
      2. Previous FY total base pay ..... $  3,784,592,034.57
      3. Previous FY active force normal cost ..... $  2,157,217,459.70
      4. Current FY actuarial gains/losses ..... $    990,203,182.75
      5. Deferred gains or losses ..... $                .00
      6. Current FY gains/losses applied ..... $     86,330,425.80
      7. Current FY total retirement cost ..... $  3,233,751,068.26
      8. No changes or changes are complete

                                        Please input a number and press <enter>.
5
    Enter any deferred gains or losses.
4785484.37

                Aggregate Previous FY and Current FY Total Data

           Enter the previous FY normal cost percentage, the previous
         FY active force normal cost, and any deferred gains or losses
         to compute the previous FY active force normal cost, current
         gains/losses applied, and the current FY total retirement cost.

      1. Previous FY normal cost percentage .....                .5700
      2. Previous FY total base pay ..... $  3,784,592,034.57
      3. Previous FY active force normal cost ..... $  2,157,217,459.70
      4. Current FY actuarial gains/losses ..... $    990,203,182.75
      5. Deferred gains or losses ..... $      4,785,484.37
      6. Current FY gains/losses applied ..... $     86,747,646.14
      7. Current FY total retirement cost ..... $  3,234,168,288.59
      8. No changes or changes are complete

                                        Please input a number and press <enter>.
8

                        Military Pension Costs

            This is a three-part interactive program that
          calculates individual, aggregate, and multi-year
          retirement costs.  Choose a selection from the
          following list of options:

            1. Program description

            2. Enter/change data and actuarial assumptions

            3. Individual entry-age cost method

            4. Aggregate entry-age cost method

            5. Expanded multi-year individual cost method

            6. Exit program

 Type in your selection number and press the <enter> key.
6
```

APPENDIX C

FORMULAS IN THE ORIGINAL ENTRYAGE COMPUTER PROGRAM

Program Formula	Explanation
CF=1983	Current Year = 1983
RF=LOS+YS	Retirement Year = Length of Service + Year of Service Entry
N=RF-CF	Number of Years to Retirement = Retirement Year - Current Year
IN=.Ø55	Salary Scale Increase = .Ø55
PP=BP FOR I=1 TO N TP=PP*IN PP=TP+PP NEXT I	This is a rather long way of computing the projected base pay at retirement. A more acceptable computation is: PP = BP x (1 + IN) ** N where PP is projected basepay at retirement (or, future value); BP is current basepay (or, present value); IN is salary scale increase (or, interest per period); and N is the number of years to retirement (or, (number of periods).
FAC=LOS+DL	The percentage of basepay that a retiree is entitled to (FAC) is computed by multiplying his/her length of service (LOS) by a percent value (DL): 50% = (2Ø years) x (2.5% per year)

Program Formula	Explanation
ANN=FAC*PP*12	A retiree's annual annuity (ANN) is computed by multiplying his/her projected base pay (PP) by his percentage of basepay (FAC) by 12 months: $18,000/yr. = 50% x $3000/mo. x 12 mo.
Q=(1+DI)**LI PRE=ANN*((1-(1/Q))/DI	The present value of a retiree's future retirement benefits are calculated: $$PRE = ANN * \frac{1 - \frac{1}{(1 + DI)^{LI}}}{DI}$$ where PRE is the present value of future retirement benefits, ANN is the yearly retirement annuity, DI is the annual discount rate, and LI is the life expectancy of the retiree at retirement. A more traditional representation of the above is: $$PV = PYMT \times \frac{1 - \frac{1}{(1 + i)^{N}}}{i}$$ where PV is the present value, PYMT is the payment, i is the interest rate per period, and N is the number of periods.

Program Formula	Explanation
`T=((1+DI)**LOS)-1` `NC=PRE*(DI/T)`	These two program statements calculate the current year's normal cost: $$NC = PRE * \frac{DI}{(1 + DI)^{LOS} - 1}$$ where NC is the normal cost, PRE is the present value, DI is the discount rate, and LOS is the retiree's length of service.

`V=N+1`
`X=1/((1+DI)**V)`
`AP=(FC+GL)*(DI/(1-X))`
	The applied gain/loss is calculated as follows:
	$$AP = (FC + GL) * \frac{DI}{1 - \frac{1}{(1 + DI)^{N+1}}}$$
	where AP is the applied gain/loss, FC is the current year gain/loss, GL is the deferred gain/loss, DI is the annual discount rate, and N is the number of years to retirement.

`RC=NC+AP`	The current year individual retirement cost (RC) is calculated by adding the current year individual retirement cost (NC) and the applied gain or loss (AP).
`PEC=PRO*TGT*NEW`	The target population retiring (PEC) is computed by multiplying the probability of a new entrant retiring (PRO) by the probability of an entrant retiring at the target paygrade (TGT) and by the number of entrants in the initial year of service (NEW).

Program Formula	Explanation
TRC=PEC*RC	The current target group retirement cost (TRC) is calculated by multiplying the target population retiring (PEC) by the current year individual retirement cost (RC).
A=N-2 RP=BP FOR K=1 TO A VP=RP*IN RP=VP+RP NEXT K SP=(IN*RP)+RP PP=(SP+RP+PP)/3	For individuals entering the services after September 1980, the pay basis for retirement is the average of the last 36 months of basepay versus ending basepay. This program "module" finds the future value of basepay to the retirement year minus two, then computes the next years' basepay. Finally, the three basepays are averaged.
PF=PBE/PCE	The normal cost percentage factor (PF) is calculated by dividing the present value of future benefits (PBE) by the present value of future composition (PCE).
MC=PF*TBF	The current year active force normal cost is calculated by multiplying the current fiscal year total base pay (TBF) by the normal cost percentage factor (PF).
VC=QF*UBF	The previous normal cost is calculated by multiplying the previous year total basepay by the previous year normal cost % factor.

APPENDIX D

VARIABLES IN THE ORIGINAL ENTRYAGE COMPUTER PROGRAM

(LISTED IN ORDER OF APPEARANCE)

LISTING OF VARIABLES AND COMPUTATIONS IN
ORDER OF APPEARANCE IN THE COMPUTER PROGRAM

I. INOIVIDUAL ENTRY AGE COST METHOD

CK$ = "PROGRAM CHOICE", i.e., 'INO' for individual method cost calculations, 'AGG' for aggregate method cost calculations, 'GANG' for expanded multiyear individual cost calculations, and 'HALT' to exit the program.

P(x,y) = "CURRENT YEAR PAY MATRIX" with rows defined by pay grade and columns defined by years of service. Contains base pay for all twenty-six paygrades (E1-E9, W1-W4, 01, 01E, 02, 02E, 03, 03E, 04-010) and for over 20 years of service (over 20 yrs., over 22 yrs., over 24 yrs., over 26 yrs., over 28 yrs., over 30 yrs.)

E(x) = "ENLISTEO LIFE EXPECTANCY MATRIX" containing thirty-one non-disability retired life expectations for ages 36 yrs. to 66 yrs., inclusive.

OZ(x) = "OFFICER LIFE EXPECTANCY MATRIX" containing thiry-one non-disability retired life expectations for ages 36 yrs. to 66 yrs., inclusive.

D(x) = "AVERAGE LOS MATRIX" containing twenty-six length-of-service (LOS) values corresponding to the twenty-six different paygrades.

F(x) = "AVERAGE AGE AT RETIREMENT MATRIX" containing twenty-six average age values for each of the twenty-six different paygrades.

FZ(x) = "TARGET RETIREMENT GRAOE PROBABILITY MATRIX" containing a probability of retiring in a particular paygrade for each of the twenty-six paygrades.

LISTING OF VARIABLES AND COMPUTATIONS IN
ORDER OF APPEARANCE IN THE COMPUTER PROGRAM

OD(x) = "OFFICER ACCESSION MATRIX" containing thirty-two values for officer accession values for the years 1951-1982, inclusive.

$\ddot{R}(x,y)$ = "PREVIOUS YEAR PAY MATRIX" containing the same rows and columns as the "CURRENT YEAR PAY MATRIX" [P(x,y)] but with the previous year's basepay data.

PG$ = "PAYGRADE AT RETIREMENT" input by operator as E1, E9, W1, O1, O3E, O5, etc.

G = An integer from 1 to 26 corresponding to "PAYGRADE AT RETIREMENT", e.g., G=1 for E1, G=2 for E2, G=10 for W1, G=26 for O10. Used to determine values from LOS and pay matrices.

YS = "YEAR OF SERVICE ENTRY" input by operator, e.g., 1972.

LOS = Either "AVERAGE LENGTH OF SERVICE FOR THIS PAYGRADE" taken from the "AVERAGE LOS MATRIX" [LOS=D(G)] contained in the program, or an "ESTIMATED LENGTH OF SERVICE AT RETIREMENT" input by the operator.

L = An integer ranging from 1 to 6 depending upon the value of LOS, e.g., if 20<=LOS<22 then L=1, etc. Used with "G" to determine values from the pay matrix.

BP = "MONTHLY BASE PAY AT RETIREMENT GRADE" based upon paygrade and length of service. Taken from the current (1983) pay matrix:

$$BP = P(G,L)$$

CF = "CURRENT FISCAL YEAR", contained in program as a fixed value (1983).

LISTING OF VARIABLES AND COMPUTATIONS IN
ORDER OF APPEARANCE IN THE COMPUTER PROGRAM

RF = "PROJECTED RETIREMENT YEAR" determined by adding "LENGTH OF SERVICE" (LOS) and "YEAR OF SERVICE ENTRY" (YS) together:

```
RF = LOS + YS
```

N = "NUMBER OF YEARS TO RETIREMENT" determined by subtracting "CURRENT YEAR" (CF) from "PROJECTED RETIREMENT YEAR" (RF):

```
N = RF - CF
```

IN = "SALARY SCALE INCREASE" default to .055, or can be changed by operator.

PP = "PROJECTED MONTHLY BASEPAY AT RETIREMENT GRADE" computed by compounding "CURRENT MONTHLY BASEPAY AT RETIREMENT GRADE" (BP) by the "SALARY SCALE INCREASE" (IN):

```
PP = BP
FOR I = 1 TO N
TP = PP * IN
PP = TP + PP
NEXT I
```

DL = "PERCENTAGE OF BASEPAY PER YEAR OF SERVICE", default value of .025 (i.e., 2 1/2 % per yr. of service), but can be changed by operator.

FAC = "PERCENTAGE OF BASEPAY FOR RETIREMENT" that a retiree has earned for retirement pay . Determined by multiplying "AVERAGE/ESTIMATED LENGTH OF SERVICE" (LOS) by "PERCENTAGE OF BASEPAY PER YEAR OF SERVICE (DL):

```
FAC = LOS * DL
```

DM = "MAXIMUM PERCENTAGE OF BASE PAY" that a retiree may receive. Default value is .75 (i.e., 75%), but can be changed by operator. If FAC is greater than DM, then FAC is assigned the value of DM.

LISTING OF VARIABLES AND COMPUTATIONS IN ORDER OF APPEARANCE IN THE COMPUTER PROGRAM

ANN = "PROJECTED ANNUAL RETIREMENT PAY" computed by multiplying "PERCENTAGE OF BASEPAY FOR RETIREMENT" (FAC) by the "PROJECTED MONTHLY BASEPAY" (PP) and by 12 months:

$$ANN = FAC * PP * 12$$

DI = "ANNUAL DISCOUNT RATE" default to .09 (i.e., 9% per year), but may be changed by the operator.

AG = "AVERAGE AGE AT RETIREMENT FOR THIS PAYGRADE" taken from the "AVERAGE AGE AT RETIREMENT MATRIX" [AG=F(G)] contained in the program, or can be changed by the operator.

Z = An integer ranging from 1 to 31 depending upon the value of AG (e.g., if 36<AG<37 then Z=1; if 45<AG<46 theb Z=31).

LI = "REMAINING LIFE EXPECTANCY (at retirement) FROM ACTUARIAL TABLES" taken from "ENLISTED/OFFICER LIFE EXPECTANCY MATRICES". Determined by "AVERAGE AGE AT RETIREMENT FOR THIS PAYGRADE" [LI=E(Z) or LI=OZ(Z)], or can be changed by the operator.

Q = An intermediate variable used to eventually compute the present value of future retirement benefits. It is computed by adding "1" to the "ANNUAL DISCOUNT RATE" (DI) and raising that sum to the "LIFE EXPECTANCY" (LI) exponent:

$$Q = (1 + DI)^{**}LI$$

PRE = "PRESENT VALUE OF FUTURE RETIREMENT BENEFITS" is computed by multiplying the "PROJECTED ANNUAL RETIREMENT PAY" (ANN) as follows:

$$PRE = ANN \times \frac{1 - (1/Q)}{DI}$$

LISTING OF VARIABLES AND COMPUTATIONS IN
ORDER OF APPEARANCE IN THE COMPUTER PROGRAM

T = An intermediate variable used to eventually compute the current year individual normal cost. It is computed as follows:

```
T = [(1 + DI) ** LOS] - 1
```

NC = "CURRENT YEAR INDIVIDUAL COST" is computed as follows:

```
NC = PRE * (DI/T)
```

JN = "SALARY SCALE %" used to calculate the "PREVIOUS YEAR NORMAL COST" (OC). Can be assigned the same value as current year "SALARY SCALE INCREASE" (IN) or can be changed by the operator.

H = Assigned the value of "G" which is an integer value corresponding to the individual's paygrade.

M = Assigned the value of "L" which is an integer value corresponding to the individual's LOS.

QP = The previous year's "MONTHLY BASE PAY AT RETIREMENT" corresponding to the current year's "BP". Taken from the "PREVIOUS YEAR PAY MATRIX":

```
QP = R(H,M)
```

O = "NUMBER OF YEARS TO RETIREMENT FROM THE PREVIOUS YEAR" and is determined by adding "1" to the "NUMBER OF YEARS TO RETIREMENT" (N):

```
O = N + 1
```

XP = "PROJECTED MONTHLY BASEPAY AT RETIREMENT CALCULATED FROM THE PREVIOUS YEAR". It is computed as follows:

```
XP = QP
FOR J = 1 TO O
UP = XP * JN
XP = UP + XP
NEXT J
```

LISTING OF VARIABLES AND COMPUTATIONS IN
ORDER OF APPEARANCE IN THE COMPUTER PROGRAM

EI = "PREVIOUS YEAR DISCOUNT RATE". Can be assigned the same value as the current year's "ANNUAL DISCOUNT RATE" (DI), or can be changed by the operator.

MI = "PREVIOUS YEAR LIFE EXPECTANCY". Can be assigned the same value as the current year's "REMAINING LIFE EXPECTANCY (at retirement)", or can be changed by the operator.

S = An intermediate value used to eventually compute the previous year's present value of future retirement benefits. It is computed by adding "1" to the "PREVIOUS YEAR DISCOUNT RATE" (EI) and raising to the "PREVIOUS YEAR LIFE EXPECTANCY" (MI) exponent:

$$S = (1 + EI)^{MI}$$

QRE = "PREVIOUS YEAR PRESENT VALUE OF FUTURE RETIREMENT BENEFITS" is computed as follows:

$$QRE = BNN \times \frac{1 - (1/S)}{EI}$$

U = An intermediate variable used to eventually compute the previous year's individual normal cost. It is computed as follows:

$$U = [(1 + EI)^{LDS}] - 1$$

DC = "PREVIOUS YEAR INDIVIDUAL NORMAL COST" is computed as follows:

$$DC = QRE * (EI/U)$$

FC = "CURRENT YEAR GAINS OR LOSSES" computed by subtracting "PREVIOUS YEAR INDIVIDUAL NORMAL COST" (DC) from the "CURRENT YEAR INDIVIDUAL NORMAL COST" (NC):

$$FC = NC - DC$$

LISTING OF VARIABLES AND COMPUTATIONS IN ORDER OF APPEARANCE IN THE COMPUTER PROGRAM

V = An intermediate variable used in the calculation of the "APPLIED GAIN OR LOSS" (AP). It is computed by adding "1" to the "NUMBER OF YEARS TO RETIREMENT" (N):

$$V = N + 1$$

X = An intermediate variable used in the calculation of the "APPLIED GAIN OR LOSS" (AP). It is calculated as follows:

$$X = \frac{1}{(1 + DI)^{**} V}$$

GL = "DEFERRED GAINS OR LOSSES". This value is either input by the operator if known, or defaults to a "0" value if unknown.

AP = "APPLIED GAIN OR LOSS" computed as follows:

$$AP = (FC + GL) \times \frac{DI}{(1 - X)}$$

RC = "CURRENT YEAR (total) RETIREMENT COST" equals the "CURRENT YEAR INDIVIDUAL NORMAL COST" (NC) plus any "APPLIED GAINS OR LOSSES" (AP):

$$RC = NC + AP$$

PRO = "PROBABILITY OF A NEW ENTRANT RETIRING". It has a Default value of .12 for enlisteds and .4 for officers, but can be changed by the operator.

FZ(G) = "PROBABILITY OF ENTRANT RETIRING AT TARGET GRADE" default to a value from the "TARGET RETIREMENT PROBABILITY MATRIX" (FZ) dependent upon paygrage, or can be changed by operator.

TGT = "PROBABILITY THAT ENTRANT RETIRES AT SELECTED TARGET" is default to the FZ(G) matrix value, or can be changed by the operator.

LISTING OF VARIABLES AND COMPUTATIONS IN
ORDER OF APPEARANCE IN THE COMPUTER PROGRAM

NEW = "NUMBER OF ENTRANTS IN INITIAL YEAR OF SERVICE". This value must be input by the operator.

PEC = "TARGET POPULATION RETIRING" calculated by multiplying the "PROBABILITY OF A NEW ENTRANT RETIRING" (PRO) by "PROBABILITY THAT THE ENTRANT RETIRES AT SELECTED TARGET" (TGT) and by the "NUMBER OF ENTRANTS IN THE INITIAL YEAR OF SERVICE" (NEW):

PEC = PRO * TGT * NEW

TRC = "CURRENT TARGET GROUP RETIREMENT COST" is calculated by multiplying the "TARGET POPULATION RETIRING" (PEC) and the "CURRENT YEAR INDIVIDUAL RETIREMENT COST" (RC) together:

TRC = PEC * RC

LISTING OF VARIABLES AND COMPUTATIONS IN
ORDER OF APPEARANCE IN THE COMPUTER PROGRAM

AGGREGATE ENTRY AGE COST METHOD

PBE = "PRESENT VALUE OF FUTURE BENEFITS". This value must be entered by the operator in millions of dollars, e.g., $4,334,785,192.32 entered as 4334.785.

PCE = "PRESENT VALUE OF FUTURE COMPENSATION". This value must be entered by operator in millions of dollars, e.g., $9,127,589,203.63 is entered as 9127.589.

PF = "NORMAL COST PERCENTAGE FACTOR" is computed by dividing the "PRESENT VALUE OF FUTURE BENEFITS" (PBE) by the "PRESENT VALUE OF FUTURE COMPENSATION (PCE):

$$PF = \frac{PBE}{PCE}$$

If this factor is not acceptable, the program allows the operator to change the value.

TBF = "CURRENT FISCAL YEAR TOTAL BASE PAY". This value must be entered by the operator in millions of dollars, e.g., $27,485,552,035.89 is entered as 27485.552.

MC = "CURRENT YEAR ACTIVE FORCE NORMAL COST" is equal to the "NORMAL COST PERCENTAGE FACTOR" (PF) multiplied by the "CURRENT FISCAL YEAR TOTAL PAY BASE" (TBF):

$$MC = PF * TBF$$

QF = "PREVIOUS YEAR NORMAL COST % FACTOR" is entered by the operator as a decimal, e.g., 43.2% is entered as .432.

UBF = "PREVIOUS YEAR TOTAL BASE PAY" is entered by the operator in millions of dollars, e.g., $22,432,518,317 is entered as 22432.518.

LISTING OF VARIABLES AND COMPUTATIONS IN
ORDER OF APPEARANCE IN THE COMPUTER PROGRAM

VC = "PREVIOUS YEAR NORMAL COST" is entered by the operator if known. Otherwise, it is calculated by multiplying the "PREVIOUS YEAR NORMAL COST % FACTOR" (QF) by the "PREVIOUS YEAR TOTAL BASE PAY" (UBF):

$$VC = QF * UBF$$

WC = "CURRENT YEAR'S ACTUARIAL GAIN OR LOSSES" computed by subtracting the "PREVIOUS YEAR ACTIVE FORCE NORMAL COST" (VC) from the "CURRENT YEAR ACTIVE FORCE NORMAL COST" (MC):

$$WC = MC - VC$$

GI = "DISCOUNT RATE" entered by the operator as a decimal, e.g., 11.2% is entered as .112.

GIS = An intermediate variable used to eventually calculate the "CURRENT YEAR GAINS/LOSSES APPLIED" (FA). It is calculated as follows:

$$GIS = (1 + GI) ** 20$$

GIST = An intermediate variable used to eventually calculate the "CURRENT YEAR GAINS/LOSSES APPLIED" (FA). It is calculated as follows:

$$GIST = \frac{1}{GIS}$$

HIST = An intermediate variable used to eventually calculate the "CURRENT YEAR GAINS/LOSSES APPLIED" (FA). It is calculated as follows:

$$HIST = (1 - GIST)$$

BLIP = An intermediate variable used to eventually calculate the "CURRENT YEAR GAINS/LOSSES APPLIED" (FA). It is calculated as follows:

$$BLIP = GI/HIST$$

LISTING OF VARIABLES AND COMPUTATIONS IN
ORDER OF APPEARANCE IN THE COMPUTER PROGRAM

FO = "AMMOUNT OF DEFERRED GAIN OR LOSS" is entered by the operator if known, or defaults to a "0" value if not known.

FA = "CURRENT YEAR GAINS/LOSSES APPLIED" is computed by adding the "CURENT YEAR'S ACTUARIAL GAIN/LOSS" (FO) together, and multiplying the sum by "BLIP":

$$FA = (WC * FO) * BLIP$$

TRC = "CURRENT YEAR TOTAL RETIREMENT COST" is computed by adding the "CURRENT YEAR ACTIVE FORCE NORMAL COST" (MC) and the "CURRENT YEAR GAINS/LOSSES APPLIED" (FA):

$$TRC = MC + FA$$

LISTING OF VARIABLES AND COMPUTATIONS IN
ORDER OF APPEARANCE IN THE COMPUTER PROGRAM

III. MULTIYEAR EXPANDED INDIVIDUAL NORMAL COST METHOD

DI = "DISCOUNT RATE" entered by the operator as a decimal, e.g., .08 for 8.0%.

IN = "SALARY SCALE ESTIMATOR" (i.e., the rate of salary increase) is entered by the operator as a decimal, e.g., .055 for 5.5% yearly rate for salary increases.

DL = "RETIREMENT PAY BASIS PER YEAR OF SERVICE" (i.e., the % rate of retired pay per year of service) is entered by the operator as a decimal, e.g., .025 for 2.5% per year.

DM = "RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC PAY" (i.e., the maximum % of pay basis at retirement) is entered by the operator as a decimal, e.g., .75 for 75%.

MRT = "MINIMUM LOS FOR RETIREMENT" (i.e., the minimum length of service required in order to retire) is entered by the operator as an integer, e.g., 25 for twenty-five years.

PROR = "ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY FOR OFFICERS" is entered by the operator as a decimal, e.g., .01 for a 1% increase. The baseline value is .40 (i.e., 40% probability). A zero (0) is entered for no change to the baseline value.

PROQ = "ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY FOR ENLISTED PERSONNEL" is entered by the operator as a decimal, e.g., -.02 for a 2% decrease. The baseline value is .12 (i.e., 12% probability). A zero is entered for no change to the baseline value.

LISTING OF VARIABLES AND COMPUTATIONS IN
ORDER OF APPEARANCE IN THE COMPUTER PROGRAM

AOJ = "ADJUSTMENT TO LOS AND AGE AT RETIREMENT" value is entered by operator as an integer, either unsigned or with a negative sign, e.g., -2 indicating a decrease of two years. A zero (0) is entered for no change.

LONG = "ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT" is entered by the operator as an integer, either unsigned or with a negative sign, e.g., 3 for three years. A zero is entered for no change.

C$ = "LEVEL OF DETAIL" for program, i.e., 'Sum' for Summary Totals and 'Detail' for Full Detail. This value is input by the operator.

DELT = A "DELTA" factor used to adjust attrition. A value of
(1) "1" is assigned by the program if "AVERAGE LOS" [D(G)+AOJ] is greater than "MINIMUM LOS FOR RETIREMENT" (MRT), or
(2) is calculated by the following formula if [(D(G)+AOJ)<MRT and (MRT>20 yrs.)]:

DELT = 1.00**[MRT-D(G)-AOJ]

G = An integer from 1 to 26 corresponding to "PAYGRADE AT RETIREMENT", e.g., G=1 for E1, G=2 for E2, G=10 for W1, G=26 for O10. Used to determine values from LOS and pay matrices.

TTTRC = "REGULAR NAVY COST" of its non-disability retirees. Computed by the following formula:

TTTRC = TTTRC + TTRC

YS = "YEAR OF SERVICE ENTRY" with the initial value of 1953, and then updated by one year for the next year group cost calculations by the formula:

YS = YS + 1

LISTING OF VARIABLES AND COMPUTATIONS IN
ORDER OF APPEARANCE IN THE COMPUTER PROGRAM

PG$ = "PAYGRADE AT RETIREMENT" initially set by program as 'E1'. After computing normal and total costs for this paygrade, resets value to 'E2'and recomputes normal and total costs. Program continues computations until costs for '010' are computed.

TTRC = "TOTAL YEAR GROUP COST" of non-disability retirees by year group, starting with 1953. Computed by the formula:

TTRC = TTRC + TRC

D(G) = "AVERAGE LOS FOR A PARTICULAR PAYGRADE" from the "AVERAGE LOS MATRIX". Determined by the value assigned to the integer variable, "G".

LOS = "LENGTH OF SERVICE" is computed by adding "AVERAGE LOS FOR A PARTICULAR PAYGRADE" [D(G)] to "ADJUSTMENT TO LOS AND AGE AT RETIREMENT" (ADJ).

LOS = D(G) + ADJ

L = An integer ranging from 1 to 6 depending upon the value of LOS, e.g., if 20<=LOS=>22 then L=1, etc. Used with "G" to determine values from the pay matrix.

P(G,L) = "CURRENT YEAR PAY" taken from the "CURRENT YEAR PAY MATRIX". The current year pay value is determined by the values of "G" and "L", which are assigned values based upon paygrade and years of service over 20 yrs.

BP = "MONTHLY BASE PAY AT RETIREMENT GRADE" based upon paygrade and length of service. Taken from the current (1983) pay matrix:

BP = P(G,L)

CF = "CURRENT FISCAL YEAR" with a program assigned value of 1983.

LISTING OF VARIABLES AND COMPUTATIONS IN
ORDER OF APPEARANCE IN THE COMPUTER PROGRAM

RF = "PROJECTED RETIREMENT YEAR" determined by adding "LENGTH OF SERVICE" (LOS) and "YEAR OF SERVICE ENTRY" (YS) together:

```
RF = LOS + YS
```

N = "NUMBER OF YEARS TO RETIREMENT" determined by subtracting "CURRENT YEAR" (CF) from "PROJECTED RETIREMENT YEAR" (RF):

```
N = RF - CF
```

PP = "PROJECTED MONTHLY BASEPAY AT RETIREMENT GRADE" computed by compounding "CURRENT MONTHLY BASEPAY AT RETIREMENT GRADE" (BP) by the "SALARY SCALE INCREASE" (IN):

```
PP = BP
FOR I = 1 TO N
TP = PP * IN
PP = TP + PP
NEXT I
```

FAC = "PERCENTAGE OF BASEPAY FOR RETIREMENT" that a retire has earned for retirement pay . Determined by multiplying "AVERAGE/ESTIMATED LENGTH OF SERVICE" (LOS) by "PERCENTAGE OF BASEPAY PER YEAR OF SERVICE (DL):

```
FAC = LOS * DL
```

ANN = "PROJECTED ANNUAL RETIREMENT PAY" computed by multiplying "PERCENTAGE OF BASEPAY FOR RETIREMENT" (FAC) by the "PROJECTED MONTHLY BASEPAY" (PP) and by 12 months:

```
ANN = FAC * PP * 12
```

F(G) = "AVERAGE AGE AT RETIREMENT", taken from the "AVERAGE AGE AT RETIREMENT MATRIX" [F(x)]. Value of F(G) is determined by the particular value of the integer variable, "G", which corresponds to a particular paygrade.

LISTING OF VARIABLES AND COMPUTATIONS IN
ORDER OF APPEARANCE IN THE COMPUTER PROGRAM

AG = "AVERAGE AGE AT RETIREMENT" taken from the "AVERAGE AGE AT RETIREMENT MATRIX" [F(G)] and modified by the "ADJUSTMENT TO LOS AND AGE AT RETIREMENT" value (ADJ):

```
AG = F(G) + ADJ
```

Z = An integer ranging from 1 to 31 depending upon the value of the retiree's age,"AG" (e.g., if 36<AG<37 then Z=1; if 45<AG<46 then Z=31).

E(Z) = "ENLISTED LIFE EXPECTANCY" taken from the "ENLISTED LIFE EXPECTANCY MATRIX" [E(x)]. The specific life expectancy value is determined by the integer variable "Z", which corresponds to a specific retirement age.

OZ(Z) = "OFFICER LIFE EXPECTANCY" taken from the "OFFICER LIFE EXPECTANCY MATRIX" [OZ(x)]. The specific life expectancy value is determined by the integer variable "Z", which corresponds to a specific retirement age.

LI = "REMAINING LIFE EXPECTANCY AT RETIREMENT" is calculated by setting the value of "LI" to a respective officer or enlisted life expectancy, and then modifying it with the "ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT" value ("LONG"):

```
LI = E(Z)
LI = LI + LONG
```

Q = An intermediate variable used to eventually compute the present value of future retirement benefits. It is computed by adding "1" to the "ANNUAL DISCOUNT RATE" (DI) and raising that sum to the "LIFE EXPECTANCY" (LI) exponent:

```
Q = (1 + DI)**LI
```

LISTING OF VARIABLES AND COMPUTATIONS IN
ORDER OF APPEARANCE IN THE COMPUTER PROGRAM

PRE = "PRESENT VALUE OF FUTURE RETIREMENT BENEFITS" is computed by multiplying the "PROJECTED ANNUAL RETIREMENT PAY" (ANN) as follows:

$$PRE = ANN \times \frac{1 - (1/Q)}{OI}$$

T = An intermediate variable used to eventually compute the current year individual normal cost. It is computed as follows:

```
T = [(1 + OI) ** LOS] - 1
```

NC = "YEAR GROUP NORMAL COST" is computed as follows:

```
NC = PRE * (OI/T)
```

RC = An intermediate variable assigned the value of the normal cost for a particular year group. It is used later to compute "YEAR GROUP TOTAL COST" (TRC):

```
RC = NC
 .
 .
 .
TRC = PEC + RC
```

PRO = "RETIREMENT PROBABILITY". It has a default value of .12 for enlisteds and .4 for officers officers, but is modified by the program as follows:

```
PRO = (PRO + PROP) * DELT
```

PROP = An intermediate variable assigned the value of either "ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY FOR OFFICERS" (PROR) or "ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY FOR ENLISTED PERSONNEL" (PROQ). PROR and PROQ are input by the operator.

LISTING OF VARIABLES AND COMPUTATIONS IN
ORDER OF APPEARANCE IN THE COMPUTER PROGRAM

FZ(G) = "PROBABILITY OF ENTRANT RETIRING AT TARGET GRADE" taken from the "TARGET RETIREMENT PROBABILITY MATRIX" (FZ). The specific probability is determined by the value of "G".

TGT = "PROBABILITY THAT ENTRANT RETIRES AT SELECTED TARGET" is assigned the value of FZ(G):

TGT = FZ(G)

NEW = "NUMBER OF ENTRANTS IN INITIAL YEAR OF SERVICE". This value is computed as follows:

IF (G>=20) THEN NEW = 1000 * OD(YS-1950)
IF (G<20) THEN NEW = 1000 * ED(YS-1950)

OD(x)/ED(x) are the "OFFICER and ENLISTED ACCESSION MATRICES" that contain accessions of officer/enlisted personnel for the years 1951-1982, inclusive.

PEC = "TARGET POPULATION RETIRING" calculated by multiplying the "PROBABILITY OF A NEW ENTRANT RETIRING" (PRO) by "PROBABILITY THAT THE ENTRANT RETIRES AT SELECTED TARGET" (TGT) and by the "NUMBER OF ENTRANTS IN THE INITIAL YEAR OF SERVICE" (NEW):

PEC = PRO * TGT * NEW

TRC = "CURRENT TARGET GROUP RETIREMENT COST" is calculated by multiplying the "TARGET POPULATION RETIRING" (PEC) and the "CURRENT YEAR INDIVIDUAL RETIREMENT COST" (RC) together:

TRC = PEC * RC

LISTING OF VARIABLES AND COMPUTATIONS IN
ORDER OF APPEARANCE IN THE COMPUTER PROGRAM

For "YEAR OF ENTRY" (YS) after 1980, the following subroutine is utilized to calculate last 3 yrs. average salary:

```
A = N - 2              (The basepay for the year that is
RP = BP                 two years before retirement is
FOR K = 1 TO A          calculated.)
VP = RP * IN
RP = VP + RP
NEXT K

SP = (IN * RP) + RP      (The basepay for the year that
                          is one year before retirement
                          is calculated.)

PP = (SP + RP + PP)/3    (The basepay for the retirement
                          year was previously computed.
                          The three basepays are added
                          and averaged.)
```

APPENDIX E

VARIABLES IN THE ORIGINAL ENTRYAGE COMPUTER PROGRAM

(LISTED IN ALPHABETICAL ORDER)

ALPHABETICAL LISTING
OF VARIABLES AND COMPUTATIONS

I. INDIVIDUAL ENTRY AGE COST METHOD

AG = "AVERAGE AGE AT RETIREMENT FOR THIS PAYGRADE" taken from the "AVERAGE AGE AT RETIREMENT MATRIX" [AG=F(G)] contained in the program, or can be changed by the operator.

ANN = "PROJECTED ANNUAL RETIREMENT PAY" computed by multiplying "PERCENTAGE OF BASEPAY FOR RETIREMENT" (FAC) by the "PROJECTED MONTHLY BASEPAY" (PP) and by 12 months:

$$ANN = FAC * PP * 12$$

AP = "APPLIED GAIN OR LOSS" computed as follows:

$$AP = (FC + GL) \times \frac{DI}{(1 - X)}$$

BP = "MONTHLY BASE PAY AT RETIREMENT GRADE" based upon paygrade and length of service. Taken from the current (1983) pay matrix:

$$BP = P(G,L)$$

CF = "CURRENT FISCAL YEAR", contained in program as a fixed value (1983).

CK$ = "PROGRAM CHOICE", i.e., 'IND' for individual method cost calculations, 'AGG' for aggregate method cost calculations, 'GANG' for expanded multiyear individual cost calculations, and 'HALT' to exit the program.

D(x) = "AVERAGE LOS MATRIX" containing twenty-six length-of-service (LOS) values corresponding to the twenty-six different paygrades: E1-E9, W1-W4, O1, O1E, O2, O2E,

ALPHABETICAL LISTING
OF VARIABLES AND COMPUTATIONS

DI = "ANNUAL DISCOUNT RATE" default to .Ø9 (i.e., 9% per year), but may be changed by the operator.

DL = "PERCENTAGE OF BASEPAY PER YEAR OF SERVICE", default value of .Ø25 (i.e., 2 1/2 % per yr. of service), but can be changed by operator.

DM = "MAXIMUM PERCENTAGE OF BASE PAY" that a retiree may receive. Default value is .75 (i.e., 75%), but can be cnanged by operator. If FAC is greater than DM, then FAC is assigned the value of DM.

E(x) = "ENLISTED LIFE EXPECTANCY MATRIX" containing thirty-one non-disability retired life expectations for ages 36 to 66 years, inclusive.

ED(x) = "ENLISTED ACCESSION MATRIX" containing thirty-two values for accessions of enlisted personnel for the years 1951-1982, inclusive.

EI = "PREVIOUS YEAR DISCOUNT RATE". Can be assigned the same value as the current year's "ANNUAL DISCOUNT RATE" (DI), or can be changed by the operator.

F(x) = "AVERAGE AGE AT RETIREMENT MATRIX" containing twenty-six average age values for each of the twenty-six different paygrades.

FAC = "PERCENTAGE OF BASEPAY FOR RETIREMENT" that a retire has earned for retirement pay . Determined by multiplying "AVERAGE/ESTIMATED LENGTH OF SERVICE" (LOS) by "PERCENTAGE OF BASEPAY PER YEAR OF SERVICE (DL):

FAC = LOS * DL

FC = "CURRENT YEAR GAINS OR LOSSES" computed by subtracting "PREVIOUS YEAR INDIVIDUAL NORMAL COST" (OC) from the "CURRENT YEAR INDIVIDUAL NORMAL COST" (NC):

ALPHABETICAL LISTING
OF VARIABLES AND COMPUTATIONS

FZ(x) = "TARGET RETIREMENT GRADE PROBABILITY MATRIX" containing a probability of retiring in a particular paygrade for each of the twenty-six paygrades.

FZ(G) = "PROBABILITY OF ENTRANT RETIRING AT TARGET GRADE" default to a value from the "TARGET RETIREMENT PROBABILITY MATRIX" (FZ) dependent upon paygrage, or can be changed by operator.

G = An integer from 1 to 26 corresponding to "PAYGRADE AT RETIREMENT", e.g., G=1 for E1, G=2 for E2, G=10 for W1, G=26 for O10. Used to determine values from LOS and pay matrices.

GL = "DEFERRED GAINS OR LOSSES". This value is either input by the operator if known, or defaults to a "0" value if unknown.

H = Assigned the value of "G" which is an integer value corresponding to the individual's paygrade.

IN = "SALARY SCALE INCREASE" default to .055, or can be changed by operator.

JN = "SALARY SCALE %" used to calculate the "PREVIOUS YEAR NORMAL COST" (OC). Can be assigned the same value as current year "SALARY SCALE INCREASE" (IN) or can be changed by the operator.

L = An integer ranging from 1 to 6 depending upon the value of LOS, e.g., if 20<=LOS=>22 then L=1, etc. Used with "G" to determine values from the pay matrix.

LI = "REMAINING LIFE EXPECTANCY (at retirement) FROM ACTUARIAL TABLES" taken from "ENLISTED/OFFICER LIFE EXPECTANCY MATRICES". Determined by "AVERAGE AGE AT RETIREMENT FOR THIS PAYGRADE" [LI=E(Z) or

ALPHABETICAL LISTING
OF VARIABLES AND COMPUTATIONS

LOS = Either "AVERAGE LENGTH OF SERVICE FOR THIS PAYGRADE" taken from the "AVERAGE LOS MATRIX" [LOS=D(G)] contained in the program, or an "ESTIMATED LENGTH OF SERVICE AT RETIREMENT" input by the operator.

M = Assigned the value of "L" which is an integer value corresponding to the individual's LOS.

MI = "PREVIOUS YEAR LIFE EXPECTANCY". Can be assigned the same value as the current year's "REMAINING LIFE EXPECTANCY (at retirement)", or can be changed by the operator.

N = "NUMBER OF YEARS TO RETIREMENT" determined by subtracting "CURRENT YEAR" (CF) from "PROJECTED RETIREMENT YEAR" (RF):

$$N = RF - CF$$

NC = "CURRENT YEAR INDIVIDUAL COST" is computed as follows:

$$NC = PRE * (DI/T)$$

NEW = "NUMBER OF ENTRANTS IN INITIAL YEAR OF SERVICE". This value must be input by the operator.

O = "NUMBER OF YEARS TO RETIREMENT FROM THE PREVIOUS YEAR" and is determined by adding "1" to the "NUMBER OF YEARS TO RETIREMENT" (N):

$$O = N + 1$$

OC = "PREVIOUS YEAR INDIVIDUAL NORMAL COST" is computed as follows:

$$OC = QRE * (EI/U)$$

OD(x) = "OFFICER ACCESSION MATRIX" containing thirty-two values for officer accession values for the years

ALPHABETICAL LISTING
OF VARIABLES AND COMPUTATIONS

OZ(x) = "OFFICER LIFE EXPECTANCY MATRIX" containing thirty-one non-disability retired life expectations for ages 36 to 66 years, inclusive.

P(x,y) = "CURRENT YEAR PAY MATRIX" with 26 rows defined by pay grade and 6 columns defined by years of service. The rows contain basepay amounts for all twenty-six pay-grades (E1-E9, O1, O1E, O2, O2E, O3, O3E, O4-O1Ø). The columns correspond tp pay entitlements for 2Ø, 22, 24, 26, 28, and 3Ø years of service.

PEC = "TARGET POPULATION RETIRING" calculated by multiplying the "PROBABILITY OF A NEW ENTRANT RETIRING" (PRO) by "PROBABILITY THAT THE ENTRANT RETIRES AT SELECTED TARGET" (TGT) and by the "NUMBER OF ENTRANTS IN THE INITIAL YEAR OF SERVICE" (NEW):

```
PEC = PRO * TGT * NEW
```

PG$ = "PAYGRADE AT RETIREMENT" input by operator as E1, E9, W1, O1, O3E, O5, etc.

PP = "PROJECTED MONTHLY BASEPAY AT RETIREMENT GRADE" computed by compounding "CURRENT MONTHLY BASEPAY AT RETIREMENT GRADE" (BP) by the "SALARY SCALE INCREASE" (IN):

```
PP = BP
FOR I = 1 TO N
TP = PP * IN
PP = TP + PP
NEXT I
```

PRE = "PRESENT VALUE OF FUTURE RETIREMENT BENEFITS" is computed by multiplying the "PROJECTED ANNUAL RETIREMENT PAY" (ANN) as follows:

$$PRE = ANN \times \frac{1 - (1/Q)}{DI}$$

ALPHABETICAL LISTING
OF VARIABLES AND COMPUTATIONS

PRO = "PROBABILITY OF A NEW ENTRANT RETIRING". It has a default value of .12 for enlisteds and .4 for officers, but can be changed by the operator.

Q = An intermediate variable used to eventually compute the present value of future retirement benefits. It is computed by adding "1" to the "ANNUAL DISCOUNT RATE" (DI) and raising that sum to the "LIFE EXPECTANCY" (LI) exponent:

$$Q = (1 + DI)^{**}LI$$

QP = The previous year's "MONTHLY BASE PAY AT RETIREMENT" corresponding to the current year's "BP". Taken from the "PREVIOUS YEAR PAY MATRIX":

$$QP = R(H,M)$$

QRE = "PREVIOUS YEAR PRESENT VALUE OF FUTURE RETIREMENT BENEFITS" is computed as follows:

$$QRE = BNN \times \frac{1 - (1/S)}{EI}$$

R(x,y) = "PREVIOUS YEAR PAY MATRIX" containing the same rows and columns as the "CURRENT YEAR PAY MATRIX" [P(x,y)] but with the previous year's basepay data.

RC = "CURRENT YEAR (total) RETIREMENT COST" equals the "CURRENT YEAR INDIVIDUAL NORMAL COST" (NC) plus any "APPLIED GAINS OR LOSSES" (AP):

$$RC = NC + AP$$

RF = "PROJECTED RETIREMENT YEAR" determined by adding "LENGTH OF SERVICE" (LOS) and "YEAR OF SERVICE ENTRY" (YS) together:

$$RF = LOS + YS$$

ALPHABETICAL LISTING
OF VARIABLES AND COMPUTATIONS

S = An intermediate value used to eventually compute the previous year's present value of future retirement benefits. It is computed by adding "1" to the "PREVIOUS YEAR DISCOUNT RATE" (EI) and raising to the "PREVIOUS YEAR LIFE EXPECTANCY" (MI) exponent:

```
S = (1 + EI) ** MI
```

T = An intermediate variable used to eventually compute the current year individual normal cost. It is computed as follows:

```
T = [(1 + DI) ** LOS] - 1
```

TGT = "PROBABILITY THAT ENTRANT RETIRES AT SELECTED TARGET" is default to the FZ(G) matrix value, or can be changed by the operator.

TRC = "CURRENT TARGET GROUP RETIREMENT COST" is calculated by multiplying the "TARGET POPULATION RETIRING" (PEC) and the "CURRENT YEAR INDIVIDUAL RETIREMENT COST" (RC) together:

```
TRC = PEC * RC
```

U = An intermediate variable used to eventually compute the previous year's individual normal cost. It is computed as follows:

```
U = [(1 + EI) ** LOS] - 1
```

V = An intermediate variable used in the calculation of the "APPLIED GAIN OR LOSS" (AP). It is computed by adding "1" to the "NUMBER OF YEARS TO RETIREMENT" (N):

```
V = N + 1
```

ALPHABETICAL LISTING
OF VARIABLES AND COMPUTATIONS

X = An intermediate variable used in the calculation of the "APPLIED GAIN OR LOSS" (AP). It is calculated as follows:

$$X = \frac{1}{(1 + DI) ** V}$$

XP = "PROJECTED MONTHLY BASEPAY AT RETIREMENT CALCULATED FROM THE PREVIOUS YEAR". It is computed as follows:

```
XP = QP
FOR J = 1 TO O
UP = XP * JN
XP = UP + XP
NEXT J
```

YS = "YEAR OF SERVICE ENTRY" input by operator, e.g., 1972.

Z = An integer ranging from 1 to 31 depending upon the value of AG (e.g., if 36<AG<37 then Z=1; if 45<AG<46 theb Z=31).

ALPHABETICAL LISTING
OF VARIABLES AND COMPUTATIONS

II. AGGREGATE ENTRY AGE COST METHOD

BLIP = An intermediate variable used to eventually calculate the "CURRENT YEAR GAINS/LOSSES APPLIED" (FA). It is calculated as follows:

$$BLIP = GI/HIST$$

FA = "CURRENT YEAR GAINS/LOSSES APPLIED" is computed by adding the "CURENT YEAR'S ACTUARIAL GAIN/LOSS" (FD) together, and multiplying the sum by "BLIP":

$$FA = (WC * FD) * BLIP$$

FD = "AMOUNT OF DEFERRED GAIN OR LOSS" is entered by the operator if known, or defaults to a "Ø" value if not known.

GI = "DISCOUNT RATE" entered by the operator as a decimal, e.g., 11.2% is entered as .112.

GIS = An intermediate variable used to eventually calculate the "CURRENT YEAR GAINS/LOSSES APPLIED" (FA). It is calculated as follows:

$$GIS = (1 + GI) ** 2Ø$$

GIST = An intermediate variable used to eventually calculate the "CURRENT YEAR GAINS/LOSSES APPLIED" (FA). It is calculated as follows:

$$GIST = \frac{1}{GIS}$$

HIST = An intermediate variable used to eventually calculate the "CURRENT YEAR GAINS/LOSSES APPLIED" (FA). It is calculated as follows:

$$HIST = (1 - GIST)$$

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ALPHABETICAL LISTING
OF VARIABLES AND COMPUTATIONS

MC = "CURRENT YEAR ACTIVE FORCE NORMAL COST" is equal to the "NORMAL COST PERCENTAGE FACTOR" (PF) multiplied by the "CURRENT FISCAL YEAR TOTAL PAY BASE" (TBF):

$$MC = PF * TBF$$

PBE = "PRESENT VALUE OF FUTURE BENEFITS". This value must be entered by the operator in millions of dollars, e.g., $4,334,785,192.32 entered as 4334.785.

PCE = "PRESENT VALUE OF FUTURE COMPENSATION". This value must be entered by operator in millions of dollars, e.g., $9,127,589,203.63 is entered as 9127.589.

PF = "NORMAL COST PERCENTAGE FACTOR" is computed by dividing the "PRESENT VALUE OF FUTURE BENEFITS" (PBE) by the "PRESENT VALUE OF FUTURE COMPENSATION (PCE):

$$PF = \frac{PBE}{PCE}$$

The program allows the operator to change the value.

QF = "PREVIOUS YEAR NORMAL COST % FACTOR" is entered by the operator as a decimal, e.g., 43.2% is entered as .432.

TBF = "CURRENT FISCAL YEAR TOTAL BASE PAY". This value must be entered by the operator in millions of dollars, e.g., $27,485,552,035.89 is entered as 27485.552.

TRC = "CURRENT YEAR TOTAL RETIREMENT COST" is computed by adding the "CURRENT YEAR ACTIVE FORCE NORMAL COST" (MC) and the "CURRENT YEAR GAINS/LOSSES APPLIED" (FA):

$$TRC = MC + FA$$

UBF = "PREVIOUS YEAR TOTAL BASE PAY" is entered by the operator in millions of dollars, e.g., $22,432,518,317

ALPHABETICAL LISTING
OF VARIABLES AND COMPUTATIONS

VC = "PREVIOUS YEAR NORMAL COST" is entered by the operator if known. Otherwise, it is calculated by multiplying the "PREVIOUS YEAR NORMAL COST % FACTOR" (QF) by the "PREVIOUS YEAR TOTAL BASE PAY" (UBF):

VC = QF * UBF

WC = "CURRENT YEAR'S ACTUARIAL GAIN OR LOSSES" computed by subtracting the "PREVIOUS YEAR ACTIVE FORCE NORMAL COST" (VC) from the "CURRENT YEAR ACTIVE FORCE NORMAL COST" (MC):

WC = MC - VC

ALPHABETICAL LISTING
OF VARIABLES AND COMPUTATIONS

III. MULTIYEAR EXPANDED INDIVIDUAL NORMAL COST METHOD

ADJ = "ADJUSTMENT TO LOS AND AGE AT RETIREMENT" value is entered by operator as an integer, either unsigned or with a negative sign, e.g., -2 indicating a decrease of two years. A zero (Ø) is entered for no change.

AG = "AVERAGE AGE AT RETIREMENT" taken from the "AVERAGE AGE AT RETIREMENT MATRIX" [F(G)] and modified by the "ADJUSTMENT TO LOS AND AGE AT RETIREMENT" value (ADJ):

$$AG = F(G) + ADJ$$

ANN = "PROJECTED ANNUAL RETIREMENT PAY" computed by multiplying "PERCENTAGE OF BASEPAY FOR RETIREMENT" (FAC) by the "PROJECTED MONTHLY BASEPAY" (PP) and by 12 months:

$$ANN = FAC * PP * 12$$

BP = "MONTHLY BASE PAY AT RETIREMENT GRADE" based upon paygrade and length of service. Taken from the current (1983) pay matrix:

$$BP = P(G,L)$$

C$ = "LEVEL OF DETAIL" for program, i.e., `Sum' for Summary Totals and `Detail' for Full Detail. This value is input by the operator.

CF = "CURRENT FISCAL YEAR" with a program assigned value of 1983.

ALPHABETICAL LISTING
OF VARIABLES AND COMPUTATIONS

DELT = A "DELTA" factor used to adjust attrition. A value of

(1) "1" is assigned by the program if "AVERAGE LOS" [D(G)+ADJ] is greater than "MINIMUM LOS FOR RETIREMENT" (MRT), or

(2) is calculated by the following formula if [(D(G)+ADJ)<MRT and (MRT>20 yrs.)]:

DELT = 1.00**[MRT-D(G)-ADJ]

D(G) = "AVERAGE LOS FOR A PARTICULAR PAYGRADE" from the "AVERAGE LOS MATRIX". Determined by the value assigned to the integer variable, "G".

DI = "DISCOUNT RATE" entered by the operator as a decimal, e.g., .08 for 8.0%.

DL = "RETIREMENT PAY BASIS PER YEAR OF SERVICE" (i.e., the % rate of retired pay per year of service) is entered by the operator as a decimal, e.g., .025 for 2.5% per year.

DM = "RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC PAY" (i.e., the maximum % of pay basis at retirement) is entered by the operator as a decimal, e.g., .75 for 75%.

E(Z) = "ENLISTED LIFE EXPECTANCY" taken from the "ENLISTED LIFE EXPECTANCY MATRIX" [E(x)]. The specific life expectancy value is determined by the integer variable "Z", which corresponds to a specific retirement age.

FAC = "PERCENTAGE OF BASEPAY FOR RETIREMENT" that a retire has earned for retirement pay. Determined by multiplying "AVERAGE/ESTIMATED LENGTH OF SERVICE" (LOS) by "PERCENTAGE OF BASEPAY PER YEAR OF SERVICE (DL):

FAC = LOS * DL

ALPHABETICAL LISTING
OF VARIABLES AND COMPUTATIONS

F(G) = "AVERAGE AGE AT RETIREMENT", taken from the "AVERAGE AGE AT RETIREMENT MATRIX" [F(x)]. Value of F(G) is determined by the particular value of the integer variable, "G", which corresponds to a particular paygrade.

FZ(G) = "PROBABILITY OF ENTRANT RETIRING AT TARGET GRADE" taken from the "TARGET RETIREMENT PROBABILITY MATRIX" (FZ). The specific probability is determined by the value of "G".

G = An integer from 1 to 26 corresponding to "PAYGRADE AT RETIREMENT", e.g., G=1 for E1, G=2 for E2, G=10 for W1, G=26 for O10. Used to determine values from LOS and pay matrices.

IN = "SALARY SCALE ESTIMATOR" (i.e., the rate of salary increase) is entered by the operator as a decimal, e.g., .055 for 5.5% yearly rate for salary increases.

L = An integer ranging from 1 to 6 depending upon the value of LOS, e.g., if 20<=LOS=>22 then L=1, etc. Used with "G" to determine values from the pay matrix.

LI = "REMAINING LIFE EXPECTANCY AT RETIREMENT" is computed by setting the value of "LI" to a respective officer or enlisted life expectancy, and then modifying it with the "ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT" value ("LONG"):

```
LI = E(Z)
LI = LI + LONG
```

LONG = "ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT" is entered by the operator as an integer, either unsigned or with a negative sign, e.g., 3 for three years. A zero is entered for no change.

ALPHABETICAL LISTING
OF VARIABLES AND COMPUTATIONS

LOS = "LENGTH OF SERVICE" is computed by adding "AVERAGE LOS FOR A PARTICULAR PAYGRADE" [D(G)] to "ADJUSTMENT TO LOS AND AGE AT RETIREMENT" (ADJ).

$$LOS = D(G) + ADJ$$

MRT = "MINIMUM LOS FOR RETIREMENT" (i.e., the minimum length of service required in order to retire) is entered by the operator as an integer, e.g., 25 for twenty-five years.

N = "NUMBER OF YEARS TO RETIREMENT" determined by subtracting "CURRENT YEAR" (CF) from "PROJECTED RETIREMENT YEAR" (RF):

$$N = RF - CF$$

NC = "YEAR GROUP NORMAL COST" is computed as follows:

$$NC = PRE * (DI/T)$$

NEW = "NUMBER OF ENTRANTS IN INITIAL YEAR OF SERVICE". This value is computed as follows:

IF (G>=20) THEN NEW = 1000 * OD(YS-1950)
IF (G<20) THEN NEW = 1000 * ED(YS-1950)

OD(x)/ED(x) are the "OFFICER and ENLISTED ACCESSION MATRICES" that contain accessions of officer/enlisted personnel for the years 1951-1982, inclusive.

OZ(Z) = "OFFICER LIFE EXPECTANCY" taken from the "OFFICER LIFE EXPECTANCY MATRIX" [OZ(x)]. The specific life expectancy value is determined by the integer variable "Z", which corresponds to a specific retirement age.

ALPHABETICAL LISTING
OF VARIABLES AND COMPUTATIONS

PEC = "TARGET POPULATION RETIRING" calculated by multiplying the "PROBABILITY OF A NEW ENTRANT RETIRING" (PRO) by "PROBABILITY THAT THE ENTRANT RETIRES AT SELECTED TARGET" (TGT) and by the "NUMBER OF ENTRANTS IN THE INITIAL YEAR OF SERVICE" (NEW):

```
PEC = PRO * TGT * NEW
```

PGS = "PAYGRADE AT RETIREMENT" initially set by program as "E1". After computing normal and total costs for this paygrade, resets value to "E2" and recomputes normal and total costs. Program continues computations until costs for "O10" are computed.

P(G,L) = "CURRENT YEAR PAY" taken from the "CURRENT YEAR PAY MATRIX". The current year pay value is determined by the values of "G" and "L", which are assigned values based upon paygrade and years of service over 20 yrs.

PP = "PROJECTED MONTHLY BASEPAY AT RETIREMENT GRADE" computed by compounding "CURRENT MONTHLY BASEPAY AT RETIREMENT GRADE" (BP) by the "SALARY SCALE INCREASE" (IN):

```
PP = BP
FOR I = 1 TO N
TP = PP * IN
PP = TP + PP
NEXT I
```

PRE = "PRESENT VALUE OF FUTURE RETIREMENT BENEFITS" is computed by multiplying the "PROJECTED ANNUAL RETIREMENT PAY" (ANN) as follows:

$$PRE = ANN \times \frac{i - (1/Q)}{DI}$$

PRO = "RETIREMENT PROBABILITY". It has a default value of .12 for enlisteds and .4 for officers officers, but is modified by the program as follows:

```
PRO = (PRO + PROP) * DELT
```

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ALPHABETICAL LISTING
OF VARIABLES AND COMPUTATIONS

PROP = An intermediate variable assigned the value of either "ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY FOR OFFICERS" (PROR) or "ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY FOR ENLISTED PERSONNEL" (PROQ). PROR and PROQ are input by the operator.

PROQ = "ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY FOR ENLISTED PERSONNEL" is entered by the operator as a decimal, e.g., -.02 for a 2% decrease. The baseline value is .12 (i.e., 12% probability). A zero is entered for no change to the baseline value.

PROR = "ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY FOR OFFICERS" is entered by the operator as a decimal, e.g., .01 for a 1% increase. The baseline value is .40 (i.e., 40% probability). A zero (0) is entered for no change to the baseline value.

Q = An intermediate variable used to eventually compute the present value of future retirement benefits. It is computed by adding "1" to the "ANNUAL DISCOUNT RATE" (DI) and raising that sum to the "LIFE EXPECTANCY" (LI) exponent:

```
Q = (1 + DI)**LI
```

RC = An intermediate variable assigned the value of the normal cost for a particular year group. It is used later to compute "YEAR GROUP TOTAL COST" (TRC):

```
RC = NC
 .
 .
 .
TRC = PEC + RC
```

RF = "PROJECTED RETIREMENT YEAR" determined by adding "LENGTH OF SERVICE" (LOS) and "YEAR OF SERVICE ENTRY" (YS) together:

```
RF = LOS + YS
```

ALPHABETICAL LISTING
OF VARIABLES AND COMPUTATIONS

T = An intermediate variable used to eventually compute the current year individual normal cost. It is computed as follows:

$$T = [(1 + DI) ** LOS] - 1$$

TGT = "PROBABILITY THAT ENTRANT RETIRES AT SELECTED TARGET" is assigned the value of FZ(G):

$$TGT = FZ(G)$$

TRC = "CURRENT TARGET GROUP RETIREMENT COST" is calculated by multiplying the "TARGET POPULATION RETIRING" (PEC) and the "CURRENT YEAR INDIVIDUAL RETIREMENT COST" (RC) together:

$$TRC = PEC * RC$$

TTRC = "TOTAL YEAR GROUP COST" of non-disability retirees by year group, starting with 1953. Computed by the formula:

$$TTRC = TTRC + TRC$$

TTTRC = "REGULAR NAVY COST" of its non-disability retirees. Computed by the following formula:

$$TTTRC = TTTRC + TTRC$$

YS = "YEAR OF SERVICE ENTRY" with the initial value of 1953, and then updated by one year for the next year group cost calculations by the formula:

$$YS = YS + 1$$

Z = An integer ranging from 1 to 31 depending upon the value of the retiree's age, "AG" (e.g., if 36<AG<37 then Z=1; if 45<AG<46 then Z=31).

ALPHABETICAL LISTING
OF VARIABLES AND COMPUTATIONS

For "YEAR OF ENTRY" (YS) after 1980, the following subroutine is utilized to calculate last 3 yrs. average salary:

```
A = N - 2          (The basepay for the year that is
RP = BP             two years before retirement is
FOR K = 1 TO A      calculated.)
VP = RP * IN
RP = VP + RP
NEXT K

SP = (IN * RP) + RP     (The basepay for the year that
                         is one year before retirement
                         is calculated.)

PP = (SP + RP + PP)/3   (The basepay for the retirement
                         year was previously computed.
                         The three basepays are added
                         and averaged.)
```

APPENDIX F

ORIGINAL ENTRYAGE COMPUTER PROGRAM

```
00005 rem start of entryage program
00010 print '*****************************************************************'
00015 print 'This is a three part interactive program.  It calculates indi-'
00020 print 'vidual and aggregate military retirement costs.  At this point'
00025 print 'please type in ind for the individual method cost calculations,'
00030 print 'agg for aggregrate method cost calculations, or gang for expanded '
00035 print 'multi year individual cost calculations.  If you wish to exit  '
00040 print 'the program type halt.  Program loaded data has been derived from'
00045 print 'Department of Defense sources and considers 1983 to be the current'
00046 print 'year.  Please enter your program choice at this time.'
00050 print '*****************************************************************'
00055 input ck$
00075 restore
00080 dim p(27,7)
00085 dim e(32)
00090 dim oz(32)
00095 dim d(27)
00100 dim f(27)
00105 dim fz(27)
00110 dim r(27,7)
00115 dim ed(35)
00120 dim od(35)
00125 rem 1983 pay matrix
00130 read p(1,1),p(1,2),p(1,3),p(1,4),p(1,5),p(1,6)
00135 read p(2,1),p(2,2),p(2,3),p(2,4),p(2,5),p(2,6)
00140 read p(3,1),p(3,2),p(3,3),p(3,4),p(3,5),p(3,6)
00145 read p(4,1),p(4,2),p(4,3),p(4,4),p(4,5),p(4,6)
00150 read p(5,1),p(5,2),p(5,3),p(5,4),p(5,5),p(5,6)
00155 read p(6,1),p(6,2),p(6,3),p(6,4),p(6,5),p(6,6)
00160 read p(7,1),p(7,2),p(7,3),p(7,4),p(7,5),p(7,6)
00165 read p(8,1),p(8,2),p(8,3),p(8,4),p(8,5),p(8,6)
00170 read p(9,1),p(9,2),p(9,3),p(9,4),p(9,5),p(9,6)
00175 read p(10,1),p(10,2),p(10,3),p(10,4),p(10,5),p(10,6)
00180 read p(11,1),p(11,2),p(11,3),p(11,4),p(11,5),p(11,6)
00185 read p(12,1),p(12,2),p(12,3),p(12,4),p(12,5),p(12,6)
00190 read p(13,1),p(13,2),p(13,3),p(13,4),p(13,5),p(13,6)
00195 read p(14,1),p(14,2),p(14,3),p(14,4),p(14,5),p(14,6)
00200 read p(15,1),p(15,2),p(15,3),p(15,4),p(15,5),p(15,6)
00205 read p(16,1),p(16,2),p(16,3),p(16,4),p(16,5),p(16,6)
00210 read p(17,1),p(17,2),p(17,3),p(17,4),p(17,5),p(17,6)
00215 read p(18,1),p(18,2),p(18,3),p(18,4),p(18,5),p(18,6)
00220 read p(19,1),p(19,2),p(19,3),p(19,4),p(19,5),p(19,6)
00225 read p(20,1),p(20,2),p(20,3),p(20,4),p(20,5),p(20,6)
00230 read p(21,1),p(21,2),p(21,3),p(21,4),p(21,5),p(21,6)
00235 read p(22,1),p(22,2),p(22,3),p(22,4),p(22,5),p(22,6)
00240 read p(23,1),p(23,2),p(23,3),p(23,4),p(23,5),p(23,6)
00245 read p(24,1),p(24,2),p(24,3),p(24,4),p(24,5),p(24,6)
```

```
00250 read p(25,1),p(25,2),p(25,3),p(25,4),p(25,5),p(25,6)
00255 read p(26,1),p(26,2),p(26,3),p(26,4),p(26,5),p(26,6)
00260 rem enlisted life expectancy data
00265 read e(1),e(2),e(3),e(4),e(5),e(6),e(7),e(8),e(9),e(10),e(11)
00270 read e(12),e(13),e(14),e(15),e(16),e(17),e(18),e(19),e(20),e(21)
00275 read e(22),e(23),e(24),e(25),e(26),e(27),e(28),e(29),e(30),e(31)
00280 rem officer life expectancy
00285 read oz(1),oz(2),oz(3),oz(4),oz(5),oz(6),oz(7),oz(8),oz(9),oz(10),oz(11)
00290 read oz(12),oz(13),oz(14),oz(15),oz(16),oz(17),oz(18),oz(19),oz(20),oz(21)
00295 read oz(22),oz(23),oz(24),oz(25),oz(26),oz(27),oz(28),oz(29),oz(30),oz(31)
00300 rem average los matrix
00305 read d(1),d(2),d(3),d(4),d(5),d(6),d(7),d(8),d(9)
00310 read d(10),d(11),d(12),d(13),d(14),d(15),d(16),d(17),d(18)
00315 read d(19),d(20),d(21),d(22),d(23),d(24),d(25),d(26)
00320 rem average age at retirement matrix
00325 read f(1),f(2),f(3),f(4),f(5),f(6),f(7),f(8),f(9)
00330 read f(10),f(11),f(12),f(13),f(14),f(15),f(16),f(17),f(18)
00335 read f(19),f(20),f(21),f(22),f(23),f(24),f(25),f(26)
00340 rem target retirement grade probability matrix
00345 read fz(1),fz(2),fz(3),fz(4),fz(5),fz(6),fz(7),fz(8),fz(9)
00350 read fz(10),fz(11),fz(12),fz(13),fz(14),fz(15),fz(16),fz(17),fz(18)
00355 read fz(19),fz(20),fz(21),fz(22),fz(23),fz(24),fz(25),fz(26)
00360 rem enlisted accession matrix
00365 read ed(1),ed(2),ed(3),ed(4),ed(5),ed(6),ed(6),ed(8),ed(9),ed(10),ed(11)
00370 read ed(12),ed(13),ed(14),ed(15),ed(16),ed(17),ed(18),ed(19),ed(20),ed(21)
00375 read ed(22),ed(23),ed(24),ed(25),ed(26),ed(27),ed(28),ed(29),ed(30),ed(31)
00380 read ed(32)
00385 rem officer accession matrix
00390 read od(1),od(2),od(3),od(4),od(5),od(6),od(7),od(8),od(9),od(10),od(11)
00395 read od(12),od(13),od(14),od(15),od(16),od(17),od(18),od(19),od(20),od(21)
00400 read od(22),od(23),od(24),od(25),od(26),od(27),od(28),od(29),od(30),od(31)
00405 read od(32)
00410 rem 1983 pay data
00415 data 573.6,573.6,573.6,573.6,573.6,573.6
00420 data 642.9,642.9,642.9,642.9,642.9,642.9
00425 data 762.3,762.3,762.3,762.3,762.3,762.3
00430 data 888.6,888.6,888.6,888.6,888.6,888.6
00435 data 1102.8,1102.8,1102.8,1102.8,1102.8,1102.8
00440 data 1299.3,1299.3,1299.3,1299.3,1299.3,1299.3
00445 data 1483.5,1583.1,1583.1,1779.9,1779.9,1779.9
00450 data 1681.2,1779.9,1779.9,1978.5,1978.5,1978.5
00455 data 1917.9,2019,2019,2215.2,2215.2,2215.2
00460 data 1660.8,1660.8,1660.8,1660.8,1660.8,1660.8
00465 data 1789.8,1862.4,1862.4,1862.4,1862.4,1862.4
00470 data 1994.1,2066.4,2066.4,2139.3,2139.3,2139.3
00475 data 2267.7,2243.6,2243.6,2526,2526,2526
00480 data 1382.4,1382.4,1382.4,1382.4,1382.4,1384.2
00485 data 1716.6,1716.6,1716.6,1716.6,1716.6,1716.6
00490 data 1752.6,1752.6,1752.6,1752.6,1752.6,1752.6
00495 data 2029.2,2029.2,2029.2,2029.2,2029.2,2029.2
00500 data 2361.9,2361.9,2361.9,2361.9,2361.9,2361.9
00505 data 2397.3,2397.3,2397.3,2397.3,2397.3,2397.3
00510 data 2731.2,2731.2,2731.2,2731.2,2731.2,2731.2
00515 data 3155.7,3266.1,3266.1,3266.1,3266.1,3266.1
00520 data 3488.4,3690.9,3690.9,4002.9,4002.9,4002.9
00525 data 4555.8,4555.8,4555.8,4555.8,4555.8,4555.8
00530 data 4791.6,4791.6,4791.6,4791.6,4791.6,4791.6
00535 data 4791.6,4791.6,4791.6,4791.6,4791.6,4791.6
00540 data 4791.6,4791.6,4791.6,4791.6,4791.6,4791.6
00545 rem enlisted life expectancy data
00550 data 37.47,36.57,35.67,34.77,33.86,32.95,32.04,31.14,30.24,29.34,28.46
00555 data 27.59,26.73,25.88,25.04,24.22,23.41,22.62,21.86,21.1,20.36
```

```
00560 data 19.62,18.9,18.18,17.47,16.78,16.1,15.44,14.79,14.16,13.54
00565 rem officer life expectancy data
00570 data 40.9,39.97,39.04,38.13,37.2,36.28,35.37,34.45,33.54,32.63,31.73
00575 data 30.83,29.94,29.06,28.18,27.31,26.45,25.6,24.75,23.91,23.09
00580 data 22.27,21.46,20.65,19.87,19.08,18.31,17.55,16.81,16.07,15.35
00585 rem average los data
00586 rem note there is an entry in this matrix -and the two below-
00587 rem for o1,o1e,o2,o2e,o3,o3e -  hence 26 entries
00590 data 20.8,20.4,20.8,21,21,21,21.8,22.7,24.3
00595 data 22.1,22.7,23.1,22.7,21.9,21.9,22.5,22.5,24.1
00600 data 24.1,24.2,24.9,28,29.9,30.4,30.4,30.4
00605 rem average age at retirement data
00610 data 38.8,39.8,40.6,40.7,40.5,40,40.9,41.3,42.9
00615 data 43,44.1,42.2,47.1,43.1,43.1,44,44,43.6
00620 data 43.6,44.4,46.3,50.5,53,56.2,58.1,59.8
00625 rem target retirement grade probability data
00630 data .0001,.0001,.0023,.0128,.0578,.2734,.4229,.101,.0546
00635 data .005,.017,.0102,.0129,.0003,.0003,.0044,.0044,.0252
00640 data .0252,.3926,.3299,.2586,.002,.0138,.003,.0006
00645 rem enlisted accession data
00650 data 202.4,171.4,88.1,54.9,121.4,112,80.4,89.7,86.4,91.4,94.2
00655 data 107.4,85.3,95,94.3,145.7,101.1,122.8,147.1,100.2,78.7,89.2
00660 data 99,83.6,89.7,99.2,104.7,70.1,65.6,75.1,79.1,63.9
00665 rem officer accession data
00670 data 8,9,11.9,11.4,9.7,8.8,13.4,8.9,8.9,11,8.6
00675 data 11.9,10.5,9.8,10.9,11,13,13.1,13.6,3.5,9.5,11.1
00680 data 7.6,6,6.5,6.6,6.6,6.1,7,6.8,7.5,7
00685 rem 1982 pay data
00690 read r(1,1),r(1,2),r(1,3),r(1,4),r(1,5),r(1,6)
00695 read r(2,1),r(2,2),r(2,3),r(2,4),r(2,5),r(2,6)
00700 read r(3,1),r(3,2),r(3,3),r(3,4),r(3,5),r(3,6)
00705 read r(4,1),r(4,2),r(4,3),r(4,4),r(4,5),r(4,6)
00710 read r(5,1),r(5,2),r(5,3),r(5,4),r(5,5),r(5,6)
00715 read r(6,1),r(6,2),r(6,3),r(6,4),r(6,5),r(6,6)
00720 read r(7,1),r(7,2),r(7,3),r(7,4),r(7,5),r(7,6)
00725 read r(8,1),r(8,2),r(8,3),r(8,4),r(8,5),r(8,6)
00730 read r(9,1),r(9,2),r(9,3),r(9,4),r(9,5),r(9,6)
00735 read r(10,1),r(10,2),r(10,3),r(10,4),r(10,5),r(10,6)
00740 read r(11,1),r(11,2),r(11,3),r(11,4),r(11,5),r(11,6)
00745 read r(12,1),r(12,2),r(12,3),r(12,4),r(12,5),r(12,6)
00750 read r(13,1),r(13,2),r(13,3),r(13,4),r(13,5),r(13,6)
00755 read r(14,1),r(14,2),r(14,3),r(14,4),r(14,5),r(14,6)
00760 read r(15,1),r(15,2),r(15,3),r(15,4),r(15,5),r(15,6)
00765 read r(16,1),r(16,2),r(16,3),r(16,4),r(16,5),r(16,6)
00770 read r(17,1),r(17,2),r(17,3),r(17,4),r(17,5),r(17,6)
00775 read r(18,1),r(18,2),r(18,3),r(18,4),r(18,5),r(18,6)
00780 read r(19,1),r(19,2),r(19,3),r(19,4),r(19,5),r(19,6)
00785 read r(20,1),r(20,2),r(20,3),r(20,4),r(20,5),r(20,6)
00790 read r(21,1),r(21,2),r(21,3),r(21,4),r(21,5),r(21,6)
00795 read r(22,1),r(22,2),r(22,3),r(22,4),r(22,5),r(22,6)
00800 read r(23,1),r(23,2),r(23,3),r(23,4),r(23,5),r(23,6)
00805 read r(24,1),r(24,2),r(24,3),r(24,4),r(24,5),r(24,6)
00810 read r(25,1),r(25,2),r(25,3),r(25,4),r(25,5),r(25,6)
00815 read r(26,1),r(26,2),r(26,3),r(26,4),r(26,5),r(26,6)
00820 rem 1982 pay data
00825 data 551.4,551.4,551.4,551.4,551.4,551.4
00830 data 618.3,618.3,618.3,618.3,618.3,618.3
00835 data 732.9,732.9,732.9,732.9,732.9,732.9
00840 data 854.4,854.4,854.4,854.4,854.4,854.4
00845 data 1060.5,1060.5,1060.5,1060.5,1060.5,1060.5
00850 data 1249.2,1249.2,1249.2,1249.2,1249.2,1249.2
00855 data 1426.5,1522.2,1522.2,1711.5,1711.5,1711.5
```

```
00860 data 1616.4,1711.5,1711.5,1902.3,1902.3,1902.3
00865 data 1844.1,1941.3,1941.3,2130,2130,2130
00870 data 1596.9,1596.9,1596.9,1596.9,1596.9,1596.9
00875 data 1721.1,1790.7,1790.7,1790.7,1790.7,1790.7
00880 data 1917.3,1986.9,1986.9,2057.1,2057.1,2057.1
00885 data 2180.4,2253.6,2253.6,2428.8,2428.8,2428.8
00890 data 1329.3,1329.3,1329.3,1329.3,1329.3,1329.3
00895 data 1650.6,1650.6,1650.6,1650.6,1650.6,1650.6
00900 data 1685.1,1685.1,1685.1,1685.1,1685.1,1685.1
00905 data 1951.2,1951.2,1951.2,1951.2,1951.2,1951.2
00910 data 2271,2271,2271,2271,2271,2271
00915 data 2305.2,2305.2,2305.2,2305.2,2305.2,2305.2
00920 data 2626.2,2626.2,2626.2,2626.2,2626.2,2626.2
00925 data 3034.2,3140.4,3140.4,3140.4,3140.4,3140.4
00930 data 3354.3,3349,3349,3849,3849,3849
00935 data 4176,4176,4176,4176,4176,4176
00940 data 4176,4176,4176,4176,4176,4176
00945 data 4176,4176,4176,4176,4176,4176
00950 data 4176,4176,4176,4176,4176,4176
00951 if (ck$='halt') then stop
00952 if (ck$='agg') then goto 2360
00953 if (ck$='gang') then goto 2800
00955 rem begin individual subprogram
00960 g=99
00965 print 'Input paygrade at retirement (e.g. e7, w3, o3e, o10).'
00970 input pg$
00975 if (pg$='e1') then g=1
00980 if (pg$='e2') then g=2
00985 if (pg$='e3') then g=3
00990 if (pg$='e4') then g=4
00995 if (pg$='e5') then g=5
01000 if (pg$='e6') then g=6
01005 if (pg$='e7') then g=7
01010 if (pg$='e8') then g=8
01015 if (pg$='e9') then g=9
01020 if (pg$='w1') then g=10
01025 if (pg$='w2') then g=11
01030 if (pg$='w3') then g=12
01035 if (pg$='w4') then g=13
01040 if (pg$='o1') then g=14
01045 if (pg$='o1e') then g=15
01050 if (pg$='o2') then g=16
01055 if (pg$='o2e') then g=17
01060 if (pg$='o3') then g=18
01065 if (pg$='o3e') then g=19
01070 if (pg$='o4') then g=20
01075 if (pg$='o5') then g=21
01080 if (pg$='o6') then g=22
01085 if (pg$='o7') then g=23
01090 if (pg$='o8') then g=24
01095 if (pg$='o9') then g=25
01100 if (pg$='o10') then g=26
01105 if (g=99) then goto 960
01110 print 'Input year of service entry (e.g. 1972).'
01115 input ys
01120 if ys<1776 then goto 1110
01125 print using 'Average length of service for this paygrade = ##.##';d(g)
01130 print'Is this acceptable?  if yes type y if no type n.'
01135 input lo$
01140 if (lo$='y') then los = d(g)
01145 if (lo$='n') then goto 2080
01150 if (los <20) then goto 2080
```

```
01155 if (los<22) and (los>=20) then l=1
01160 if (los<24) and (los>=22) then l=2
01165 if (los<26) and (los>=24) then l=3
01170 if (los<28) and (los>=26) then l=4
01175 if (los<30) and (los>=28) then l=5
01180 if (los>=30) then l=6
01185 bp=p(g,l)
01190 cf=1983
01195 rf=los+ys
01200 print using 'Projected retirement year = ####';rf
01205 n=rf-cf
01210 print 'Salary scale increase is loaded as .055.'
01215 print 'Is this acceptable?  If yes type y if no type n.'
01220 input sc$
01225 if (sc$='n') then goto 2000
01230 if (sc$='y') then in=.055
01235 pp=bp
01240 for i=1 to n
01245 tp=pp*in
01250 pp=tp+pp
01255 next i
01260 print using 'Current monthly basepay at retirement grade =$#####.##';bp
01265 print using 'Projected monthly basepay at retirement grade =$#####.##';pp
01270 print 'Retirement is currently computed at .025 of basepay.'
01275 print 'Is this acceptable?  If yes type y if no type n.'
01280 input dl$
01285 if (dl$='y') then dl=.025
01290 if (dl$='n') then goto 2220
01295 fac =los * dl
01300 print 'Retirement ceiling is currently set at .75 of base pay.'
01305 print 'Is this acceptable?  If yes type y if no type n.'
01310 input dm$
01315 if (dm$='y') then dm=.75
01320 if (dm$='n') then goto 2250
01325 if (fac>dm) then fac=dm
01330 if (ys>1980) then goto 2030
01335 ann=fac*pp*12
01340 print using 'Projected annual retirement pay =$######.##';ann
01345 print 'Annual discount rate is loaded as .09.'
01350 print 'Is this acceptable?  If yes type y if no type n.'
01360 input dx$
01365 if (dx$='n') then goto 2095
01370 if (dx$='y') then di=.09
01375 print using 'Average age at retirement for this paygrade = ##.##';f(g)
01380 print 'Is this acceptable?  If yes type y if no type n.'
01385 input go$
01390 if (go$='y') then ag=f(g)
01395 if (go$='n') then goto 2110
01400 if (ag<36) then goto 2110
01405 if (ag<37) and (ag>=36) then z=1
01410 if (ag<38) and (ag>=37) then z=2
01415 if (ag<39) and (ag>=38) then z=3
01420 if (ag<40) and (ag>=39) then z=4
01425 if (ag<41) and (ag>=40) then z=5
01430 if (ag<42) and (ag>=41) then z=6
01435 if (ag<43) and (ag>=42) then z=7
01440 if (ag<44) and (ag>=43) then z=8
01445 if (ag<45) and (ag>=44) then z=9
01450 if (ag<46) and (ag>=45) then z=10
01455 if (ag<47) and (ag>=46) then z=11
01460 if (ag<48) and (ag>=47) then z=12
01465 if (ag<49) and (ag>=48) then z=13
```

```
01470 if (ag<50) and (ag>=49) then z=14
01475 if (ag<51) and (ag>=50) then z=15
01480 if (ag<52) and (ag>=51) then z=16
01485 if (ag<53) and (ag>=52) then z=17
01490 if (ag<54) and (ag>=53) then z=18
01495 if (ag<55) and (ag>=54) then z=19
01500 if (ag<56) and (ag>=55) then z=20
01505 if (ag<57) and (ag>=56) then z=21
01510 if (ag<58) and (ag>=57) then z=22
01515 if (ag<59) and (ag>=58) then z=23
01520 if (ag<60) and (ag>=59) then z=24
01525 if (ag<61) and (ag>=60) then z=25
01530 if (ag<62) and (ag>=61) then z=27
01535 if (ag<63) and (ag>=62) then z=28
01540 if (ag<64) and (ag>=63) then z=29
01545 if (ag<65) and (ag>=64) then z=30
01550 if (ag>=65) then z=31
01555 if (g<=9) then li=e(z)
01560 if (g>=10) then li=oz(z)
01565 print 'Remaining life expectancy from actuarial tables =';li
01570 print 'Is this acceptable? If yes type y if no type n.'
01575 input ch$
01580 if (ch$='n') then goto 1985
01585 q=(1+di)**li
01590 pre=ann*((1-(1/q))/di)
01595 print using 'Present value of future retirement benefits =$########.##';pre
01600 t=((1+di)**los)-1
01605 nc=pre*(di/t)
01610 print using 'Current year individual normal cost =$#######.##';nc
01615 print'First year of normal costing?  If yes type y if no type n.'
01620 input nc$
01625 if (nc$ ='y') then goto 2195
01630 print 'Do you know previous year normal cost? If yes type y if no type n.'
01635 input pn$
01640 if (pn$='y') then goto 2015
01645 print using 'Salary scale % used in current year normal cost = .####';in
01650 print 'Was this your prior year estimator?  If yes type y if no type n.'
01655 input ss$
01660 if (ss$='y') then jn=in
01665 if (ss$='n') then goto 2310
01670 h=g
01675 m=1
01680 qp=r(h,m)
01685 o=n+1
01690 xp=qp
01695 for j=1 to o
01700 up=xp*jn
01705 xp=up+xp
01710 next j
01715 if (ys>1980) then goto 2265
01720 bnn=fac*xp*12
01725 print using 'Discount rate used in current year normal cost = .####';di
01730 print 'Was this your prior year estimator?  If yes type y if no type n.'
01735 input dr$
01740 if (dr$='y') then ei=di
01745 if (dr$='n') then goto 2325
01750 print 'Remaining life expectancy used in current year normal cost =';li
01755 print 'Was this your previous estimator?  If yes type y if no type n.'
01760 input dh$
01765 if (dh$='y') then mi=li
01770 if (dh$='n') then goto 2205
01775 s=(1+ei)**mi
```

```
01780 qre=bnn*((1-(1/s))/ei)
01785 u=((1+ei)**los)-1
01790 oc=qre*(ei/u)
01795 print using 'Previous year individual normal cost=$#######.##';oc
01800 fc=nc-oc
01805 print
01810 print using 'Current year gains or losses  =$######.##';fc
01815 print 'Any deferred gains or losses?  If yes type y if no type n.'
01820 input dg$
01825 if (dg$='y') then goto 2235
01830 if (dg$='n') then gosub 2145
01835 v=n+1
01840 x=1/((1+di)**v)
01845 ap=(fc+gl)*(di/(1-x))
01850 print using 'Applied gain or loss =$######.##';ap
01855 rc=nc+ap
01860 if (g<20) then pro=.12
01865 if (g>=20) then pro=.4
01870 print using 'Current year individual retirement cost =$######.##';rc
01875 print using 'Probability of new entrant retiring = .####';pro
01880 print 'Is this acceptable?  If yes type y if no type n.'
01885 input pr$
01890 if (pr$='n') then goto 1970
01895 print using'Probability of entrant retiring at target grade = .####';fz(g)
01900 print 'Is this acceptable?  If yes type y if no type n.'
01905 input fz$
01910 if (fz$='y') then tgt=fz(g)
01915 if (fz$='n') then goto 2125
01920 if (ys>1950) and (ys<1983) then goto 2340
01925 print'Input number of entrants in initial year of service (e.g. 230000).'
01930 input new
01935 pec=pro*tgt*new
01940 print using 'Target population retiring ########';pec
01945 trc=pec*rc
01950 print 'Paygrade at retirement = ';pg$
01955 print 'Year of service entry = ';ys
01960 print using 'Current target group retirement cost =$###########.##';trc
01965 goto 5
01970 print 'Input your estimate of retirement probability (e.g. .3456).'
01975 input pro
01980 goto 1895
01985 print 'Input your estimate of remaining life expectancy (e.g. 39.41).'
01990 input li
01995 goto 1585
02000 print 'Input salary scale increase as decimal (e.g. .065).
02005 input in
02010 goto 1235
02015 print 'Input previous year normal cost (e.g. 1389.24).'
02020 input oc
02025 goto 1800
02030 a=n-2
02035 rp=bp
02040 for k=1 to a
02045 vp=rp*in
02050 rp=vp+rp
02055 next k
02060 sp=(in*rp)+rp
02065 pp=(sp+rp+pp)/3
02070 print using 'Retirement basis for post 1980 entrant =$#######.##';pp
02075 goto 1335
02080 print 'Input your estimate length of service at retirement (e.g. 24.8).'
02085 input los
```

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02090 goto 1150
02095 print 'Input discount rate estimate as decimal (e.g. .11).'
02100 input di
02105 goto 1375
02110 print 'Input your estimate of age at retirement (e.g. 47.86).'
02115 input ag
02120 goto 1400
02125 print 'Input your probability that entrant retires at selected target'
02130 print'rank/grade (e.g. .235).
02135 input tgt
02140 goto 1920
02145 print
02150 print'Deferred gains and losses are the amortized value of differences'
02155 print'caused by fluctuations in the estimating variables over time.  The'
02160 print'actuarial model dampens the impact of these fluctuations to a zero'
02165 print'average over the working life of the individual.  Therefore, an'
02170 print'entry of zero for this variable does not invalidate the model.'
02175 print
02180 gl=0
02185 fd=0
02190 return
02195 ap=0
02200 goto 1855
02205 print 'Input your estimate of remaining life expectancy (e.g. 42.1).'
02210 input mi
02215 goto 1775
02220 print 'Input desired retirement rate as decimal (e.g. .025).'
02225 input dl
02230 goto 1295
02235 print 'Amount of deferred gain or loss (e.g. 11.34).'
02240 input gl
02245 goto 1835
02250 print 'Input desired retirement ceiling as decimal (e.g. .75).'
02255 input dm
02260 goto 1325
02265 b=o-2
02270 yp=qp
02275 for c=1 to b
02280 wp=yp*jn
02285 yp=wp+yp
02290 next c
02295 zp=(jn*yp)+yp
02300 xp=(yp+zp+xp)/3
02305 goto 1720
02310 print 'Input prior year salary scale % estimator as a decimal (e.g. .06).'
02315 input jn
02320 goto 1670
02325 print 'Input prior year discount rate estimator as a decimal (e.g. .09).'
02330 input ei
02335 goto 1750
02340 if (g>=20) then new=1000*od(ys-1950)
02345 if (g<20) then new=1000*ed(ys-1950)
02350 print 'Number of regular entrants in intial year of service =';new
02355 goto 1935
02360 print 'You are now in the aggregate method portion of this program.'
02365 rem begin aggregate subprogram
02370 print'All dollar amounts should be input as millions (e.g. $12,332,223.24'
02375 print 'should be typed as 12.332).
02380 print
02385 print 'What is the present value of future benefits?  (e.g. 4334.785).'
02390 input pbe
02395 print 'What is the present value of future compensation? (e.g. 9127.589).'
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02400 input pce
02405 pf=pbe/pce
02410 print using 'Normal cost percentage factor as decimal =#.####';pf
02415 print 'Is this acceptable?  If yes type y if no type n.'
02420 input pf$
02425 if (pf$='y') then goto 2435
02430 if (pf$='n') then goto 2605
02435 print 'Input current fiscal year total base pay (e.g. 27485.552).'
02440 input tbf
02445 mc=pf*tbf
02450 print using 'Current year active force normal cost =$#####.###';mc
02455 print 'First year of normal costing?  If yes type y if no type n.'
02460 input an$
02465 if (an$='y') then goto 2650
02470 print 'Do you know previous year normal cost? If yes type y if no type n.'
02475 input se$
02480 if (se$='n') then goto 2490
02485 If (se$='y') then goto 2620
02490 print 'Input previous year normal cost % factor as a decimal (e.g. .432).'
02495 input qf
02500 print 'Input previous year total base pay (e.g. 22432.518).'
02505 input ubf
02510 vc=qf*ubf
02515 print using 'Previous year normal cost =$#####.###';vc
02520 wc=mc-vc
02525 print using 'Current years actuarial gain or loss =$#####.###';wc
02530 print 'Any deferred gain or loss?  If yes type y if no type n.'
02535 input dg$
02540 if (dg$='y') then goto 2635
02545 if (dg$='n') then gosub 2145
02550 print 'Input discount rate as decimal (e.g. .112).'
02555 input gi
02560 gis=(1+gi)**20
02565 gist=1/gis
02570 hist=1-gist
02575 blip=gi/hist
02580 fa=(wc+fd)*blip
02585 print using 'Current year gains/losses applied =$####.###';fa
02590 trc=mc+fa
02595 print using 'Current year total retirement cost =$#####.###';trc
02600 goto 5
02605 print 'Input override normal cost % factor as decimal (e.g. .553).'
02610 input pf
02615 goto 2435
02620 print 'Input previous year normal cost (e.g. 4123.237).'
02625 input vc
02630 goto 2520
02635 print 'Input amount of deferred gain or loss (e.g. 1213.456).'
02640 input fd
02645 goto 2550
02650 fa=0
02655 goto 2590
02700 rem multiyear expanded individual normal cost subprogram
02800 print 'You are now in the multiyear expanded individual normal cost '
02805 print 'portion of the program.  Note that in this section an answer to'
02810 print 'an adjustment question of 0 means no change.'
03000 Print 'Input desired discount rate as decimal (e.g. .08).
03005 input di
03010 print 'Input desired rate of salary increase as decimal (e.g. .055).
03015 input in
03020 print 'Input desired % rate of retired pay per year of duty (e.g. .025)'
03025 input dl
```

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03030 print 'Input desired maximum % of pay basis at retirement (e.g. .75).
03031 input dm
03032 print 'Input minimum los required to retire (e.g. 20).
03033 input mrt
03040 print 'Input adjustment to entrant retirement probability for officers'
03041 print '(e.g. -.02). The baseline value is 0.4.
03042 input pror
03045 print 'Input adjustment to entrant retirement probability for'
03046 print 'enlisted personnel.
03047 print '(e.g. -.02). The baseline value is 0.12.
03048 input proq
03050 print 'Input adjustment to LOS and age at retirement (e.g. -2).
03055 input adj
03060 print 'Input adjustment to life expectancy at retirement (e.g. +3).
03065 input long
03066 print'If you wish to see only summary totals, type sum.'
03067 print 'If you wish to see full detail, type detail.'
03068 input c$
03069 delt=1
03070 g=99
03075 tttrc=0
03080 ys=1953
03085 pg$='e1'
03090 print'*****************************************************:*******'
03095 ttrc=0
03100 if (pg$='e1') then g=1
03105 if (pg$='e2') then g=2
03110 if (pg$='e3') then g=3
03115 if (pg$='e4') then g=4
03120 if (pg$='e5') then g=5
03125 if (pg$='e6') then g=6
03130 if (pg$='e7') then g=7
03135 if (pg$='e8') then g=8
03140 if (pg$='e9') then g=9
03145 if (pg$='w1') then g=10
03150 if (pg$='w2') then g=11
03155 if (pg$='w3') then g=12
03160 if (pg$='w4') then g=13
03165 if (pg$='o1') then g=14
03170 if (pg$='o1e') then g=15
03175 if (pg$='o2') then g=16
03180 if (pg$='o2e') then g=17
03185 if (pg$='o3') then g=18
03190 if (pg$='o3e') then g=19
03195 if (pg$='o4') then g=20
03200 if (pg$='o5') then g=21
03205 if (pg$='o6') then g=22
03210 if (pg$='o7') then g=23
03215 if (pg$='o8') then g=24
03220 if (pg$='o9') then g=25
03225 if (pg$='o10') then g=26
03230 if (g=99) then goto 3070
03235 los=d(g)+adj
03240 if (los <mrt) then los=mrt
03245 if (los<22) and (los>=20) then l=1
03250 if (los<24) and (los>=22) then l=2
03255 if (los<26) and (los>=24) then l=3
03260 if (los<28) and (los>=26) then l=4
03265 if (los<30) and (los>=28) then l=5
03270 if (los>=30) then l=6
03275 bp=p(g,l)
03280 cf=1983
```

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03285 rf=los+ys
03290 n=rf-cf
03295 pp=bp
03300 for i=1 to n
03305 tp=pp*in
03310 pp=tp+pp
03315 next i
03320 fac =los * dl
03325 if (fac>dm) then fac=dm
03330 if (ys>1980) then goto 3650
03335 ann=fac*pp*12
03340 if (pg$='el') then goto 3600
03345 if (n<0) then goto 3710
03349 if (d(g)+adj<mrt) and (mrt>20) then goto 3706
03350 ag=f(g)+adj
03355 if (ag<17+mrt) then ag=17+mrt
03360 if (ag<37) and (ag>=36) then z=1
03365 if (ag<38) and (ag>=37) then z=2
03370 if (ag<39) and (ag>=38) then z=3
03375 if (ag<40) and (ag>=39) then z=4
03380 if (ag<41) and (ag>=40) then z=5
03385 if (ag<42) and (ag>=41) then z=6
03390 if (ag<43) and (ag>=42) then z=7
03395 if (ag<44) and (ag>=43) then z=8
03400 if (ag<45) and (ag>=44) then z=9
03405 if (ag<46) and (ag>=45) then z=10
03410 if (ag<47) and (ag>=46) then z=11
03415 if (ag<48) and (ag>=47) then z=12
03420 if (ag<49) and (ag>=48) then z=13
03425 if (ag<50) and (ag>=49) then z=14
03430 if (ag<51) and (ag>=50) then z=15
03435 if (ag<52) and (ag>=51) then z=16
03440 if (ag<53) and (ag>=52) then z=17
03445 if (ag<54) and (ag>=53) then z=18
03450 if (ag<55) and (ag>=54) then z=19
03455 if (ag<56) and (ag>=55) then z=20
03460 if (ag<57) and (ag>=56) then z=21
03465 if (ag<58) and (ag>=57) then z=22
03470 if (ag<59) and (ag>=58) then z=23
03475 if (ag<60) and (ag>=59) then z=24
03480 if (ag<61) and (ag>=60) then z=25
03485 if (ag<62) and (ag>=61) then z=27
03490 if (ag<63) and (ag>=62) then z=28
03495 if (ag<64) and (ag>=63) then z=29
03500 if (ag<65) and (ag>=64) then z=30
03505 if (ag>=65) then z=31
03510 if (g<=9) then li=e(z)
03515 if (g>=10) then li=oz(z)
03520 li=li+long
03525 q=(1+di)**li
03530 pre=ann*((1-(1/q))/di)
03535 t=((1+di)**los)-1
03540 nc=pre*(di/t)
03545 rc=nc
03548 if (g>=20) then goto 3555
03550 if (g<20) then pro=.12
03552 if (g<20) then prop=proq
03554 goto 3560
03555 if (g>=20) then pro=.4
03556 if (g>=20) then prop=pror
03560 pro=(pro+prop)*delt
03562 delt=1
```

```
03565 tgt=fz(g)
03570 if (ys>1950) and (ys<1983) then goto 3695
03575 pec=pro*tgt*new
03580 trc=pec*rc
03585 ttrc=ttrc+trc
03587 if (c$='sum') then goto 3595
03590 print using '##############',pg$;nc;trc
03595 goto 3725
03600 print 'Year of entry = ';ys
03601 if (c$='sum') then goto 3645
03605 print 'Discount rate =';di
03610 print 'Salary scale estimator = ';in
03615 print 'Adjustment to entrant retirement probability for'
03616 print 'officers = ';pror
03617 print 'Adjustment to entrant retirement probability for'
03618print 'enlisted personnel = ';proq
03620 print 'Adjustment to LOS and age at retirement = ';adj
03625 print 'Adjustment to life expectancy at retirement = ';long
03630 print 'Retirement pay basis per year of service = ';dl
03635 print 'Retirement pay ceiling as percentage of basic = ';dm
03637 print 'Minimum los for retirement = ';mrt
03640 print 'Paygrade    Normal Cost    Total Cost'
03645 goto 3345
03650 a=n-2
03655 rp=bp
03660 for k=1 to a
03665 vp=rp*in
03670 rp=vp+rp
03675 next k
03680 sp=(in*rp)+rp
03685 pp=(sp+rp+pp)/3
03690 goto 3335
03695 if (g>=20) then new=1000*od(ys-1950)
03700 if (g<20) then new=1000*ed(ys-1950)
03705 goto 3575
03706 ag=f(g)+mrt-d(g)-adj
03707 REM FORMULA TO AJD ATTRITON IF AVG LOS < MLOS FOR RETIREMENT
03708 DELT=1.00**(MRT-D(G)-ADJ)
03709 goto 3355
03710 nc=0
03715 trc=0
03720 goto 3585
03725 if (pg$='o10') then goto 3845
03730 if (pg$='o9') then pg$='o10'
03735 if (pg$='o8') then pg$='o9'
03740 if (pg$='o7') then pg$='o8'
03745 if (pg$='o6') then pg$='o7'
03750 if (pg$='o5') then pg$='o6'
03755 if (pg$='o4') then pg$='o5'
03760 if (pg$='o3e') then pg$='o4'
03765 if (pg$='o2e') then pg$='o3e'
03770 if (pg$='o1e') then pg$='o2e'
03775 if (pg$='w4') then pg$='o1e'
03780 if (pg$='w3') then pg$='w4'
03785 if (pg$='w2') then pg$='w3'
03790 if (pg$='w1') then pg$='w2'
03795 if (pg$='e9') then pg$='w1'
03800 if (pg$='e8') then pg$='e9'
03805 if (pg$='e7') then pg$='e8'
03810 if (pg$='e6') then pg$='e7'
03815 if (pg$='e5') then pg$='e6'
03820 if (pg$='e4') then pg$='e5'
```

```
03825 if (pg$='e3') then pg$='e4'
03830 if (pg$='e2') then pg$='e3'
03835 if (pg$='e1') then pg$='e2'
03840 goto 3100
03845 print using 'Total Year Group Cost =  $##############';ttrc
03850 tttrc=tttrc+ttrc
03855 if ys=1982 then goto 3870
03860 ys=ys+1
03865 goto 3085
03870 print'*************************************************************'
03875 print using 'Regular Navy Cost = $######################';tttrc
03880 print'*************************************************************'
03885 goto 10
03890 end
```

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